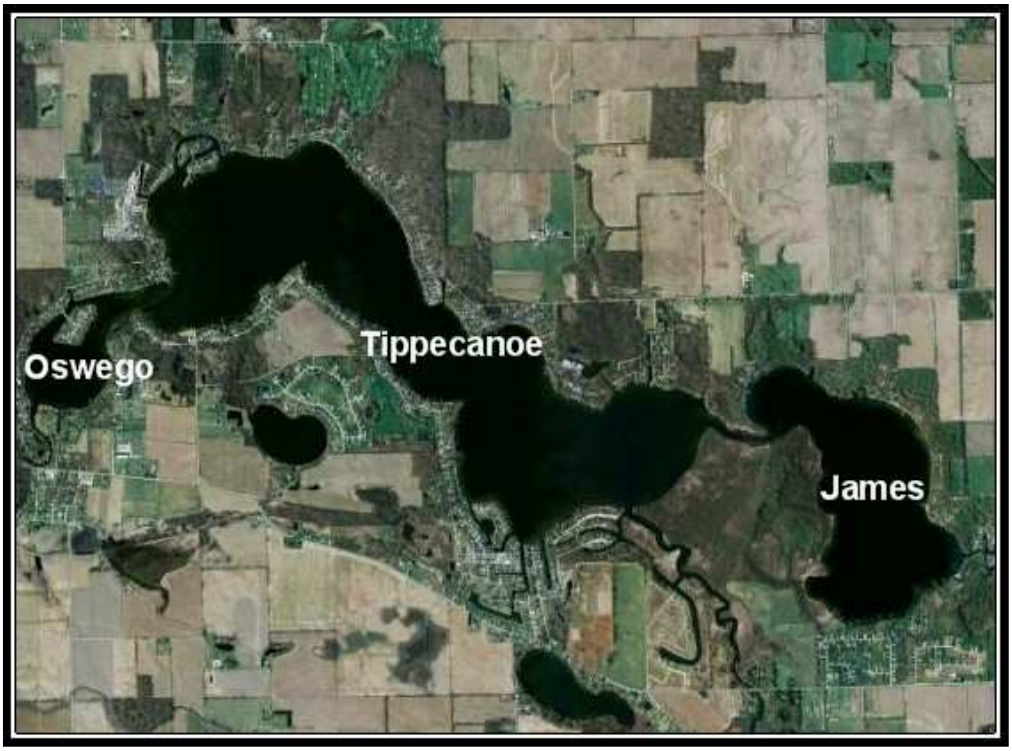
Lake Tippecanoe Aquatic Vegetation Management Plan
2007 Update
Kosciusko County, Indiana

February 14, 2008



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Executive Summary

Aquatic Control was contracted by the Lake Tippecanoe Property Owners Association (LTPOA) to complete aquatic vegetation sampling in order to update their lakewide, long-term integrated aquatic vegetation management plan. Funding for development of this plan was obtained from the Lake Tippecanoe Property Owners Association and the Indiana Department of Natural Resources-Division of Fish and Wildlife as part of the Lake and River Enhancement program (LARE). The update serves as a tool to track changes in the vegetation community, to adjust the action plan as needed, and to maintain eligibility for LARE funds. Items covered include the 2007 sampling results, a review of the 2007 vegetation controls, and updates to the budget and action plans.

Aquatic vegetation is an important component of lakes in Indiana; however, as a result of many factors this vegetation can develop to a nuisance level. Nuisance aquatic vegetation, as used in this paper, describes plant growth that negatively impacts the present uses of the lake including fishing, boating, swimming, aesthetic, and lakefront property values. The primary exotic nuisance species within Lake Tippecanoe are Eurasian watermilfoil (*Myriophyllum spicatum*) and curlyleaf pondweed (*Potamogeton crispus*). Eel grass (*Vallisneria Americana*) and filamentous bluegreen algae are also abundant in the Lake Tippecanoe chain and can create nuisance conditions.

The primary recommendations for plant control within the Lake Tippecanoe chain included the use of Renovate 3 herbicide (active ingredient: triclopyr) to selectively control Eurasian watermilfoil and early season treatments with Aquathol K herbicide (active ingredient: endothal) for control of curlyleaf pondweed throughout the lakes. The goals of the plant controls are to maintain Eurasian watermilfoil and curlyleaf pondweed below 10% frequency of occurrence in all three lakes while maintaining a minimum of 80% vegetative cover of the littoral zone. In addition to the herbicide applications, it was also recommended that plant surveys be conducted in order to map treatment areas and document changes in the native and invasive plant community.

On April 23, 2007, a visual survey was completed in order to map out curlyleaf pondweed treatment areas. On April 30, 104 acres of curlyleaf pondweed was treated with Aquathol K. This treatment was funded exclusively by the LTPOA. Eurasian watermilfoil treatment areas were mapped on May 31, 2007. A total of 40.7 acres of milfoil was mapped within the three lakes of which 22.1 acres was considered dense. Funds were available for treatment of only 34 acres, so the decision was made to treat the densest beds of milfoil and areas that had the highest potential of spread. A total of 34 acres of milfoil was treated on June 12, 2007 with Renovate 3 herbicide. A total of 15.8 acres was treated on Tippecanoe, 5.9 acres on James, and 12.3 acres on Oswego. The treatment effectively controlled milfoil in the targeted areas.

A Tier II survey was completed on all three lakes on July 23, 2007. This survey was completed in order to document changes in the native plant community and document the results of the herbicide treatments. No milfoil was detected in Oswego Lake and milfoil

continued to be below 10% frequency of occurrence in Lake Tippecanoe and James Lake. There appeared to be little change in the native plant community when compared to past sampling data.

A public meeting was held on September 13, 2007 in order to inform lake users of the plant management activities and gain their input on the direction of the plan. The primary concern that came out of the meeting was a need to address the problems caused by eel grass. Another meeting was conducted with the LARE biologist, District Fisheries Biologist and representatives from LTPOA on November 9. Sampling and treatment data along with a potential budget and action plan was presented and discussed at this meeting.

A great deal of information has been gathered over the past several years of vegetation management on the Lake Tippecanoe chain of lakes. That information is used to create the following list of recommendations:

1. Continue with treatment of Eurasian watermilfoil with Renovate 3 herbicide throughout the lakes. Approximately 34 acres of milfoil may require treatment next season.

2. Continue with the early season curlyleaf treatment program. A minimum of 104 acres should be treated next year. The same areas that were treated in 2007 should be treated again in 2008 and 2009 and possibly 2010 in order to exhaust turion supply.

3. Complete pre-treatment invasive mapping surveys along with Tier II surveys prior to the curlyleaf treatment and again in late July or early August.

4. Complete treatment of eel grass in areas where treatment has been permitted in the past. Additional areas will require IDNR approval. This may require a 1-2 hour tour of the lake during the summer with IDNR biologists, Association representatives, and herbicide contractors.

5. Protect areas of beneficial emergent vegetation through establishment of eco-zones and by educating residents of the benefits of these few remaining areas.

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1.0 INTRODUCTION

This report was created in order to update the Lake Tippecanoe Aquatic Vegetation Management Plan which was intended to cover the years 2005-2010. The plan update was funded by the Lake Tippecanoe Property Owners Association (LTPOA) and the Indiana Department of Natural Resources (IDNR) Lake and River Enhancement (LARE) program. The update serves as a tool to track changes in the vegetation community, to adjust the action plan as needed, and to maintain eligibility for LARE funds. Items covered include the 2007 sampling results, a review of the 2007 vegetation controls, and updates to the budget and action plans. Once reviewed and approved, the update should be included in the original vegetation management plan, following the 2006 update and prior to the original appendix.

2.0 2007 PLANT SAMPLING

Three surveys were completed on Tippecanoe, Oswego, and James Lakes in order to document changes in the plant community, map potential treatment areas, to determine the success or failure of control techniques, and to aid in 2008 planning. A curlyleaf map of the three lakes was created on April 23 prior to the early season curlyleaf treatment, on May 31 an Invasive Mapping Survey was completed to document remaining areas of curlyleaf pondweed and to map Eurasian watermilfoil prior to the LARE funded treatment, and on July 23 a Tier II survey was completed in order to document changes in the native and invasive plant communities and to aid in the 2008 planning.

2.1 Pre-Treatment Curlyleaf Mapping

On April 23 a pre-treatment curlyleaf pondweed mapping survey was completed on all three lakes. The Association did not receive LARE funding for an early season curlyleaf treatment, but decided that control of this invasive was a priority and used their funds to cover treatment costs. The Association had funds for treatment of up to 104 acres (acreage based on last season's Tier I survey). This survey was designed to locate all areas of curlyleaf pondweed in order to make an accurate application. The survey was completed by boating over the littoral areas of the lake in a tight zigzag fashion. In shallow areas curlyleaf was located by observation from the deck of the boat, while rakes were used in deeper areas. Location of curlyleaf was recorded on a GPS and backed up by recording on a paper map. This information was taken back to the office where it was downloaded into a mapping program that allowed for accurate acreage estimates. Figure 1 is the curlyleaf treatment map that was created from the survey. A total of 114 acres was discovered in the lakes, but 104 acres was the limit set due to budget restrictions. The areas marked on the map were the areas that contained the densest areas of curlyleaf pondweed. Lake Tippecanoe had a total of 68.86 acres, 20.82 acres on James, and 14.32 acres on Oswego.

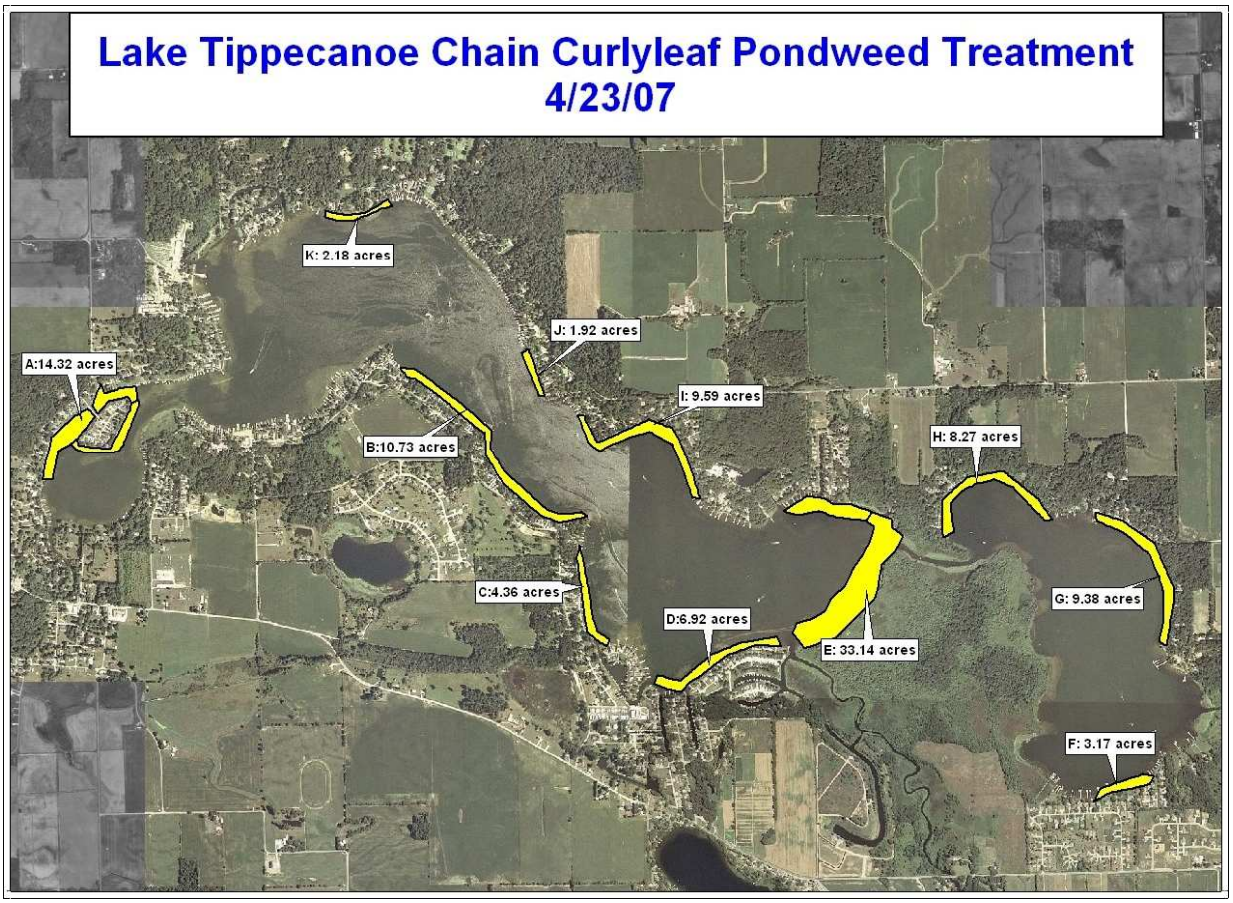

Figure 1. Lake Tippecanoe Chain, curlyleaf pondweed areas, April 23, 2007.

2.2 Invasive Mapping Survey

The Association received a grant from LARE to complete and Invasive Mapping Survey prior to the LARE funded milfoil treatment. The invasive mapping survey was completed on May 31. The primary purpose of this survey was to determine areas of milfoil infestation that would require treatment. In addition, remaining areas of curlyleaf pondweed were also mapped. This survey was completed in a similar fashion as the pre-treatment curlyleaf mapping survey.

2.2.1 Oswego Lake Invasive Mapping Survey

A total of 12.3 acres of Eurasian watermilfoil was documented on Oswego Lake. Milfoil was only documented along the western side of the lake. A total of 1.5 acres contained milfoil at greater than 50% abundance. No curlyleaf pondweed was present in the area that was treated in April, but 1.5 acres was observed along the eastern shoreline of the lake (Figure 2).

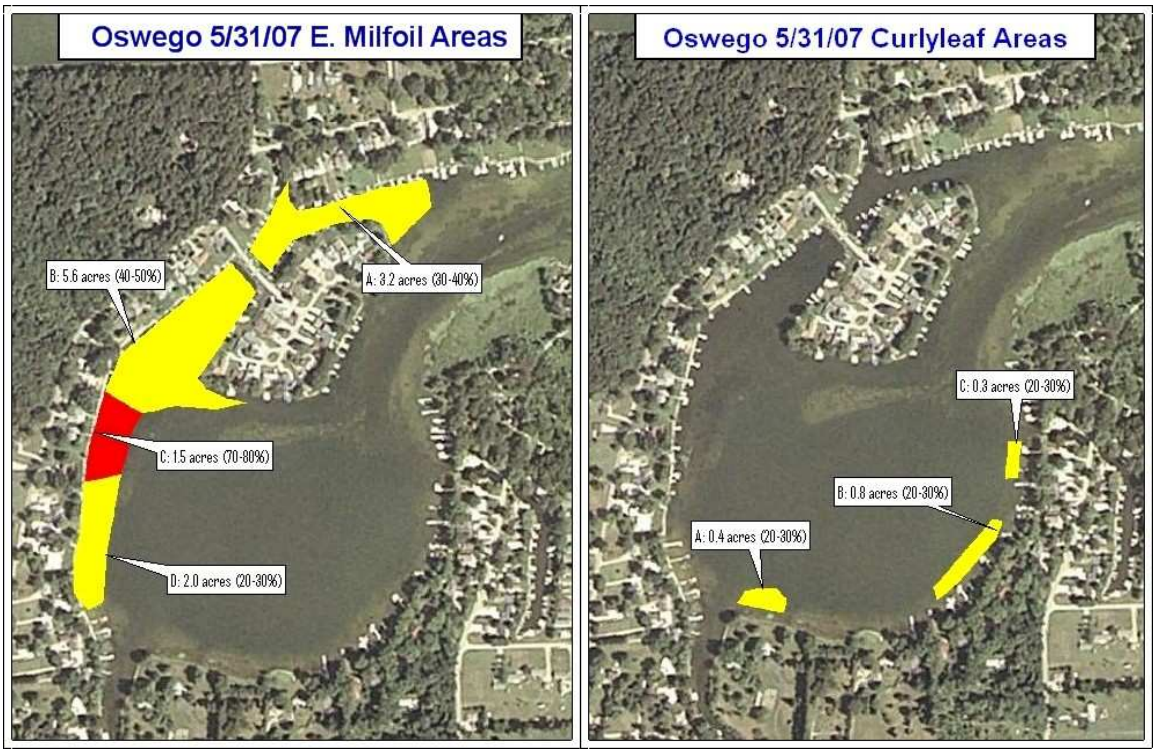

Figure 2. Oswego Lake, Eurasian watermilfoil and curlyleaf pondweed areas, May 31, 2007.

2.2.2 Lake Tippecanoe Invasive Mapping

Lake Tippecanoe was surveyed on the same day as Oswego Lake. A total of 20.3 acres of milfoil was documented within Lake Tippecanoe (Figure 3). The largest and densest area of milfoil was documented along the eastern shoreline near the mouth of Grassy Creek. This area encompassed 14.7 acres. The remaining 5.6 acres contained milfoil at less than 50% abundance.

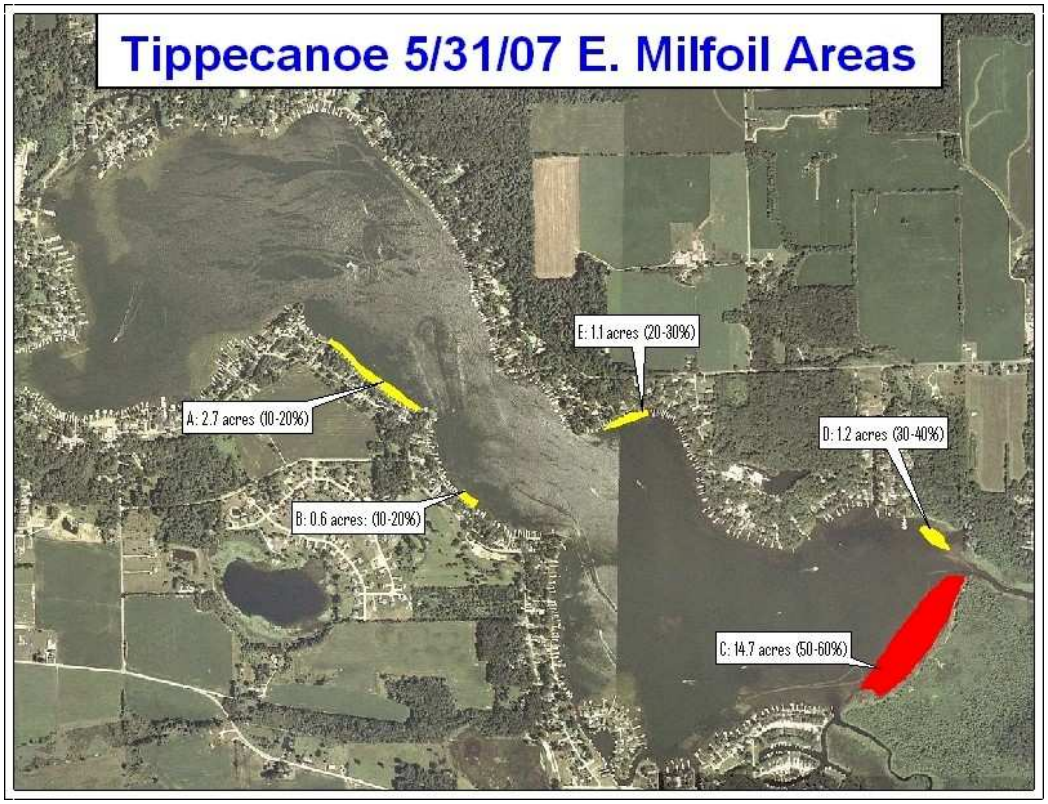

Figure 3. Lake Tippecanoe, Eurasian watermilfoil areas, May 31, 2007.

Curlyleaf pondweed was documented in 13.8 acres of Lake Tippecanoe (Figure 4). The largest area of curlyleaf was also along the eastern shore near the mouth of Grassy Creek. The curlyleaf in this area was brown and appeared to be dead. This was likely the result of the April 30 treatment. Two weeks later this area was checked and the curlyleaf pondweed was gone.

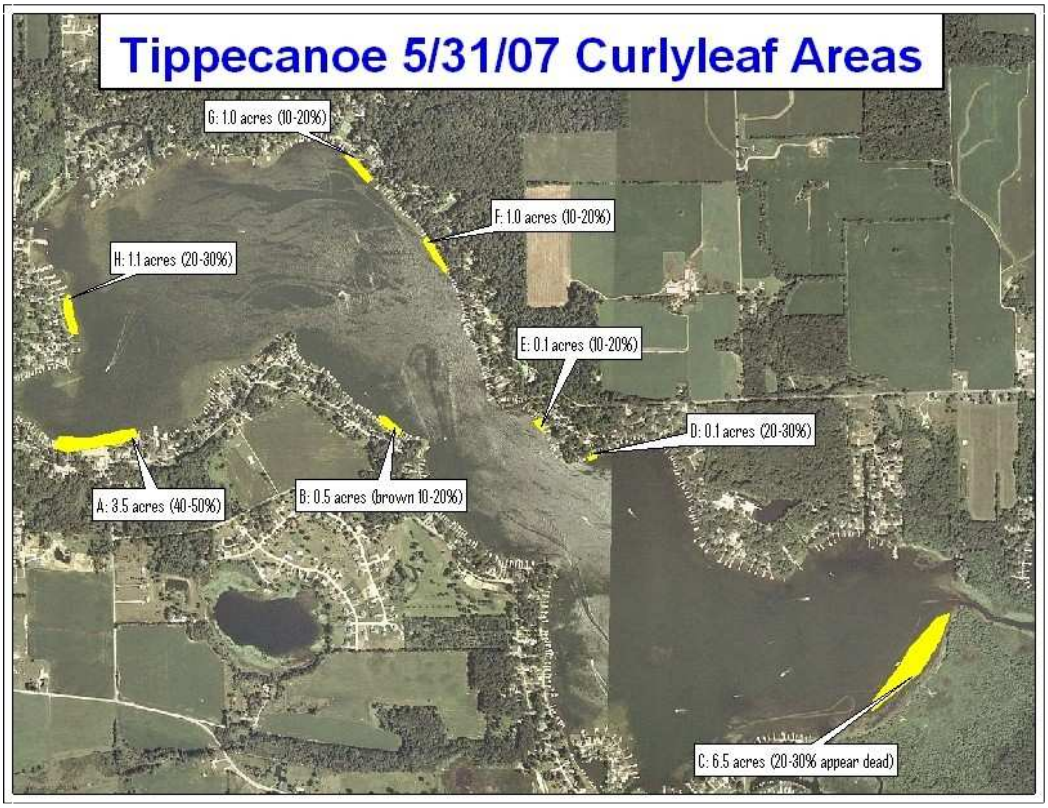

Figure 4. Lake Tippecanoe, curlyleaf pondweed areas, May 31, 2007.

2.2.2 James Lake Invasive Mapping Survey

James Lake was surveyed on the same day as Oswego and Lake Tippecanoe. A total of 8.1 acres of milfoil was documented within James Lake of which 5.9 acres was considered dense (Figure 5). Curlyeaf pondweed was documented in 4.7 acres of James Lake. Curyleaf was not considered dense in these areas.

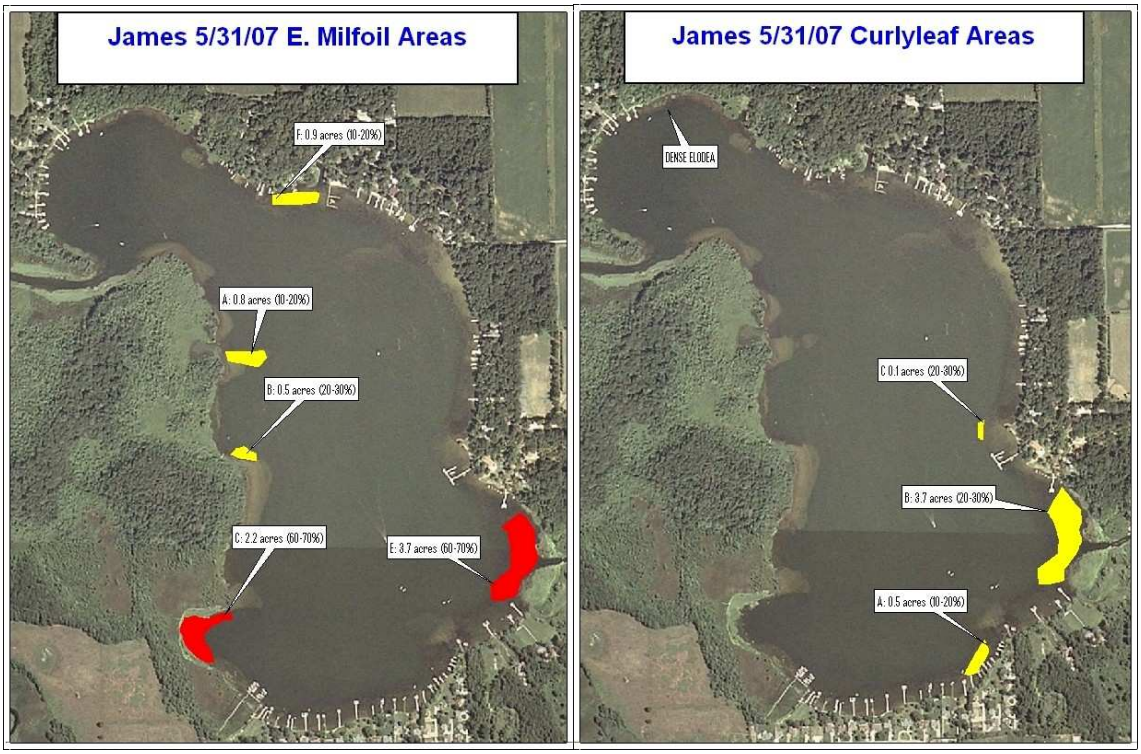

Figure 5. James Lake, Eurasian watermilfoil and curlyleaf pondweed areas, May 31, 2007.

2.3 Summer Tier II Surveys

Tier II surveys were completed on the Tippecanoe Chain on July 23, 2007. Surveys were completed according to IDNR Tier II surveying protocol (IDNR 2007). These surveys were completed in order to document changes in the native and invasive plant population. This survey also acts as a tool for planning 2008 plant management.

2.3.1 Oswego Lake Tier II Survey

A total of 40 sites were sampled throughout the littoral zone of Oswego Lake. These were the same sites that were sampled in 2006. Results of the sampling are listed in Table 1. Aquatic vegetation was present at 29 of the sites. A total of 9 species were collected of which all were native. The maximum number of species per site was 4 while the mean species per site was 1.40.

Table 1. Occurrence and Abundance of Submersed Aquatic Plants in Oswego Lake, July 23, 2007.

Occurrence and abundance of submersed aquatic plants in Oswego Lake							
County:	Kos	Sites with plants:	29		Mean species/site:	1.40	
Date:	7/23/2007	Sites with native plants:	29		Standard error (ms/s):	0.1887883	
Secchi (ft):	6	Number of species:	9		Mean native species/site:	1.40	
Maximum plant depth (ft):	19	Number of native species:	9		Standard error (mns/s):	0.1887883	
Trophic status	Mesotrophic	Maximum species/site:	4		Species diversity:	0.80	
Total sites:	40				Native species diversity:	0.80	

All depths: 0 to 19 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	40.0	60.0	20.0	10.0	10.0	19.0
eel grass	37.5	62.5	12.5	5.0	17.5	15.5
sago pondweed	20.0	80.0	7.5	7.5	5.0	8.0
Chara	15.0	85.0	2.5	5.0	7.5	7.0
Illinois pondweed	10.0	90.0	2.5	0.0	7.5	5.0
Richardson's pondweed	7.5	92.5	2.5	0.0	5.0	1.5
flatstemmed pondweed	5.0	95.0	2.5	2.5	0.0	1.0
spiny naiad	2.5	97.5	0.0	0.0	2.5	0.5
variable pondweed	2.5	97.5	0.0	2.5	0.0	0.5

Depth: 0 to 5 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
eel grass	53.3	46.7	20.0	13.3	20.0	18.7
sago pondweed	46.7	53.3	13.3	20.0	13.3	20.0
Chara	33.3	66.7	6.7	13.3	13.3	17.3
common coontail	26.7	73.3	13.3	6.7	6.7	10.7
Illinois pondweed	20.0	80.0	6.7	0.0	13.3	6.7
Richardson's pondweed	13.3	86.7	6.7	0.0	6.7	2.7
flatstemmed pondweed	6.7	93.3	0.0	6.7	0.0	1.3
spiny naiad	6.7	93.3	0.0	0.0	6.7	1.3
variable pondweed	6.7	93.3	0.0	6.7	0.0	1.3

Depth: 5 to 10 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
eel grass	66.7	33.3	11.1	0.0	44.4	35.6
common coontail	55.6	44.4	22.2	0.0	33.3	37.8
Chara	11.1	88.9	0.0	0.0	11.1	2.2
flatstemmed pondweed	11.1	88.9	11.1	0.0	0.0	2.2
Illinois pondweed	11.1	88.9	0.0	0.0	11.1	11.1
Richardson's pondweed	11.1	88.9	0.0	0.0	11.1	2.2
sago pondweed	11.1	88.9	11.1	0.0	0.0	2.2

Depths: 10 to 15 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	50.0	50.0	16.7	33.3	0.0	23.3

Depths: 15 to 19 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	50.0	50.0	37.5	12.5	0.0	15.0
eel grass	12.5	87.5	12.5	0.0	0.0	2.5

Common coontail was present at the highest percentage of sample sites (40.0%) and also the highest dominance rating (Figure 6). It appeared that coontail was most abundant at depths greater than 10.0 feet. Eel grass ranked second in site frequency (37.5%) and was most abundant in water less than 10.0 feet (Figure 7). Sago pondweed, Chara, and Illinois pondweed were all present at frequencies at or above 10%. Richardson's pondweed, a species of concern in Indiana, was present at 7.5% of sites (Figure 8). Flatstem pondweed, spiny naiad, and variable pondweed were also collected, but at lower frequencies. No curlyleaf pondweed or Eurasian watermilfoil was collected.

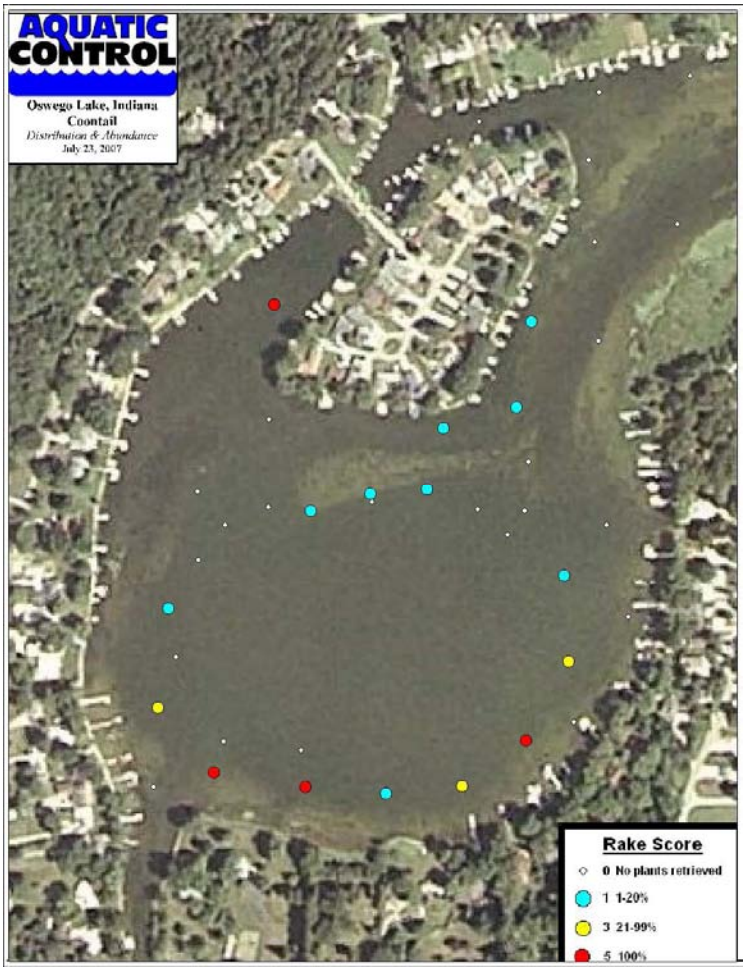

Figure 6. Oswego Lake, coontail distribution and abundance, July 23, 2007

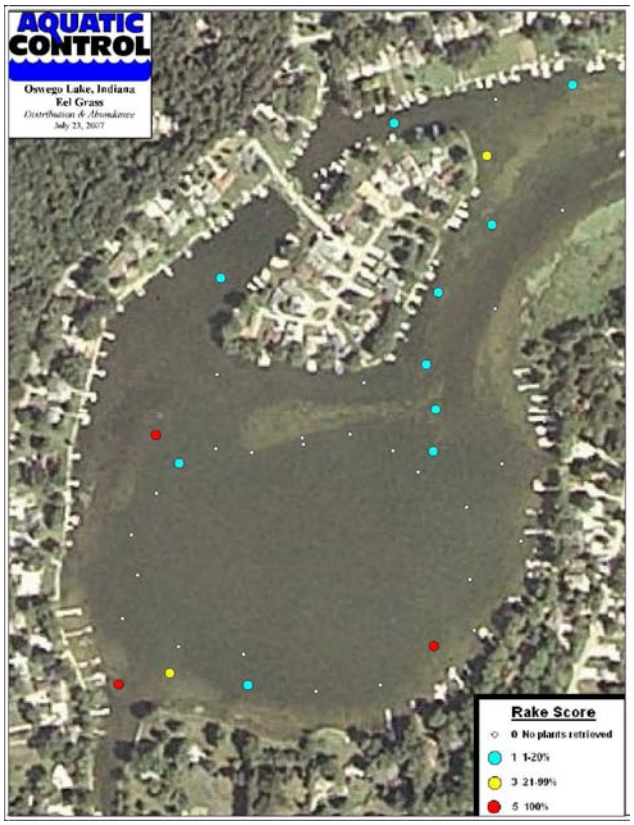

Figure 7. Oswego Lake, eel grass distribution and abundance, July 23, 2007.

Figure 8. Oswego Lake, Richardson's pondweed distribution and abundance, July 23, 2007.

2.3.2 Lake Tippecanoe Tier II Survey

A total of 89 sites were sampled throughout the littoral zone of Lake Tippecanoe. These were the same sites that were sampled in 2006 with the exception of site 90 which was not sampled due to an error that occurred between the mapping program and GPS download. Results of the sampling are listed in Table 2. Aquatic vegetation was present at 81 of the sites. A total of 13 species were collected of which 12 were native. The maximum number of species per site was 5. The mean species collected per site was 1.88 and the mean number of native species collected per site was 1.79. The species diversity index was 0.81 and the native species diversity index was 0.80.

Table 2. Occurrence and Abundance of Submersed Aquatic Plants in Lake Tippecanoe, July 23, 2007.

Occurrence and abundance of submersed aquatic plants in Tippecanoe Lake						
County:	Kos	Sites with plants:	81	Mean species/site:	1.88	
Date:	7.23.07	Sites with native plants:	81	Standard error (ms/s):	0.1286571	
Secchi (ft):	6	Number of species:	13	Mean native species/site:	1.79	
Maximum plant depth (ft):	22	Number of native species:	12	Standard error (mns/s):	0.1221947	
Trophic status	Mesotrophic	Maximum species/site:	5	Species diversity:	0.81	
Total sites:	89			Native species diversity:	0.80	

All depths (0 to 22 ft)	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
eel grass	58.4	41.6	4.5	4.5	49.4	40.4
Chara	37.1	62.9	3.4	3.4	30.3	22.2
common coontail	36.0	64.0	7.9	6.7	21.3	22.5
sago pondweed	13.5	86.5	1.1	1.1	11.2	6.3
flatstemmed pondweed	12.4	87.6	0.0	0.0	12.4	2.5
Eurasian watermilfoil	9.0	91.0	1.1	1.1	6.7	2.7
water stargrass	6.7	93.3	0.0	0.0	6.7	1.8
variable pondweed	4.5	95.5	0.0	1.1	3.4	1.3
Richardson's pondweed	4.5	95.5	0.0	0.0	4.5	0.9
American elodea	2.2	97.8	0.0	0.0	2.2	0.4
southern naiad	1.1	98.9	0.0	0.0	1.1	0.2
slender naiad	1.1	98.9	0.0	1.1	0.0	0.2
Illinois pondweed	1.1	98.9	0.0	0.0	1.1	0.2

Depths: 0 to 5 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
eel grass	72.7	27.3	4.5	6.8	61.4	49.1
Chara	68.2	31.8	6.8	6.8	54.5	40.9
sago pondweed	22.7	77.3	2.3	2.3	18.2	9.1
flatstemmed pondweed	18.2	81.8	0.0	0.0	18.2	3.6
Richardson's pondweed	9.1	90.9	0.0	0.0	9.1	1.8
variable pondweed	9.1	90.9	0.0	2.3	6.8	2.7
water stargrass	4.5	95.5	0.0	0.0	4.5	0.9
Eurasian watermilfoil	4.5	95.5	2.3	0.0	2.3	0.9
common coontail	2.3	97.7	0.0	0.0	2.3	0.5
slender naiad	2.3	97.7	0.0	2.3	0.0	0.5
southern naiad	2.3	97.7	0.0	0.0	2.3	0.5

Depths: 5 to 10 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
eel grass	84.2	15.8	10.5	5.3	68.4	58.9
common coontail	57.9	42.1	10.5	5.3	42.1	32.6
Eurasian watermilfoil	21.1	78.9	0.0	0.0	21.1	6.3
Chara	15.8	84.2	0.0	0.0	15.8	9.5
flatstemmed pondweed	15.8	84.2	0.0	0.0	15.8	3.2
water stargrass	10.5	89.5	0.0	0.0	10.5	4.2
American elodea	10.5	89.5	0.0	0.0	10.5	2.1
sago pondweed	5.3	94.7	0.0	0.0	5.3	3.2
Illinois pondweed	5.3	94.7	0.0	0.0	5.3	1.1

Depths: 10 to 15 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	66.7	33.3	16.7	25.0	25.0	40.0
eel grass	25.0	75.0	0.0	0.0	25.0	25.0
Eurasian watermilfoil	16.7	83.3	0.0	8.3	8.3	6.7
water stargrass	16.7	83.3	0.0	0.0	16.7	3.3
sago pondweed	8.3	91.7	0.0	0.0	8.3	8.3

Depths: 15 to 20 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	90.9	9.1	18.2	18.2	54.5	69.1
eel grass	9.1	90.9	0.0	0.0	9.1	1.8

Depths 20 to 22 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	66.7	33.3	33.3	0.0	33.3	40.0

Eel grass was present at the highest percentage of sample sites (58.4%) and also had the highest dominance rating (Figure 9). It appeared that eel grass was most abundant at depths less than 10.0 feet. Chara ranked second in site frequency (37.1%) and third in dominance. Common coontail ranked third in site frequency and second in dominance. Eurasian watermilfoil was the only invasive species collected and was present at 9.0% of sites (Figure 10). Richardson's pondweed was also present in Lake Tippecanoe and was sampled at 4.5% of survey sites (Figure 11).

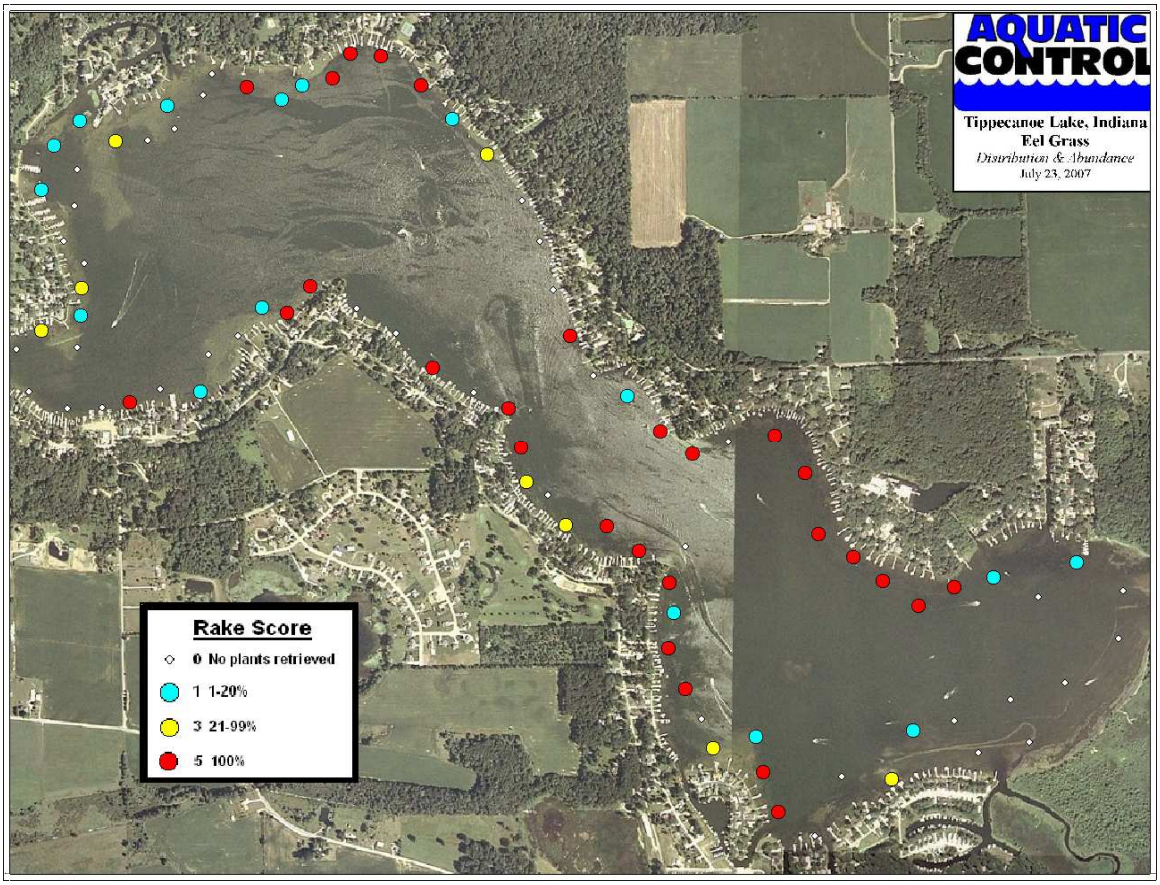

Figure 9. Lake Tippecanoe, eel grass distribution and abundance, July 23, 2007.

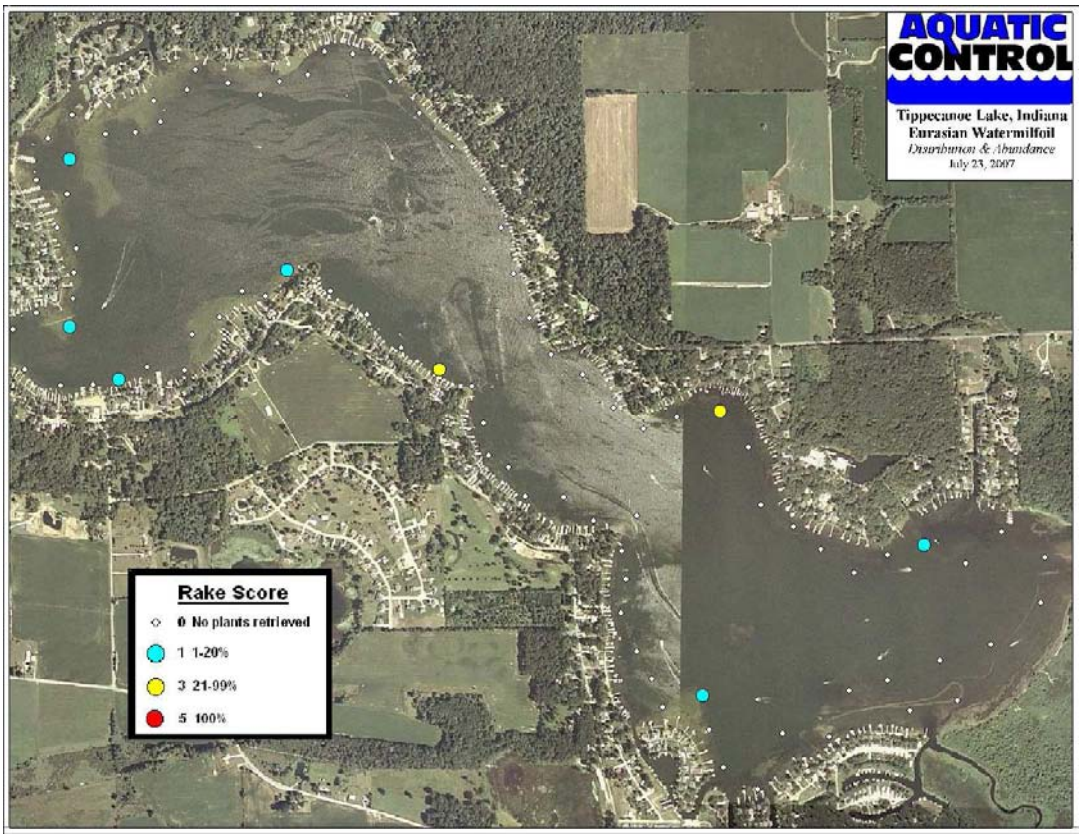

Figure 10. Lake Tippecanoe, Eurasian watermilfoil distribution and abundance, July 23, 2007.

Figure 11. Lake Tippecanoe, Richardson's pondweed distribution and abundance, July 23, 2007.

2.3.3 James Lake Tier II Survey

A total of 60 sites were sampled throughout the littoral zone of James Lake. As with the other lakes, these were the same sites that were sampled in 2006. Results of the sampling are listed in Table 3. Aquatic vegetation was present at 47 of the sites. A total of 10 species were collected of which 8 were native. The maximum number of species per site was 5. The mean species collected per site was 1.43 and the mean number of native species collected per site was 1.37. The species diversity index was 0.76 and the native species diversity index was 0.74.

Table 3. Occurrence and Abundance of Submersed Aquatic Plants in James Lake, July 23, 2007.

Occurrence and abundance of submersed aquatic plants in James Lake						
County:	Kos	Sites with plants:	47	Mean species/site:	1.43	
Date:	7/23/2007	Sites with native plants:	47	Standard error (ms/s):	0.1565278	
Secchi (ft):	7	Number of species:	10	Mean native species/site:	1.37	
Maximum plant depth (ft):	20	Number of native species:	8	Standard error (mns/s):	0.1425488	
Trophic status	Mesotrophic	Maximum species/site:	5	Species diversity:	0.76	
Total sites:	60			Native species diversity:	0.74	

All depths (0 to 20 ft)	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	56.7	43.3	11.7	11.7	33.3	38.7
Chara	26.7	73.3	5.0	8.3	13.3	12.7
eel grass	26.7	73.3	0.0	8.3	18.3	10.7
slender naiad	10.0	90.0	0.0	1.7	8.3	2.7
Eurasian watermilfoil	6.7	93.3	0.0	1.7	5.0	1.3
American elodea	5.0	95.0	0.0	1.7	1.7	2.3
sago pondweed	3.3	96.7	0.0	1.7	1.7	2.0
curlyleaf pondweed	1.7	98.3	0.0	1.7	0.0	0.3
spiny naiad	1.7	98.3	0.0	1.7	0.0	0.3

Depth: 0 to 5 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
Chara	63.6	36.4	9.1	18.2	36.4	32.7
eel grass	50.0	50.0	0.0	13.6	36.4	22.7
common coontail	31.8	68.2	9.1	9.1	13.6	15.5
slender naiad	27.3	72.7	0.0	4.5	22.7	7.3
Eurasian watermilfoil	18.2	81.8	0.0	4.5	13.6	3.6
flatstemmed pondweed	13.6	86.4	4.5	9.1	0.0	4.5
American elodea	9.1	90.9	4.5	4.5	0.0	5.5
curlyleaf pondweed	4.5	95.5	0.0	4.5	0.0	0.9
sago pondweed	4.5	95.5	0.0	4.5	0.0	0.9
spiny naiad	4.5	95.5	0.0	4.5	0.0	0.9

Depth: 5 to 10 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	93.8	6.3	18.8	18.8	56.3	63.8
eel grass	18.8	81.3	0.0	12.5	6.3	6.3
Chara	12.5	87.5	6.3	6.3	0.0	2.5
American elodea	6.3	93.8	0.0	0.0	6.3	1.3
sago pondweed	6.3	93.8	0.0	0.0	6.3	6.3

Depth: 10 to 15 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	100.0	0.0	14.3	0.0	85.7	88.6
eel grass	14.3	85.7	0.0	0.0	14.3	2.9

Depth: 15 to 20 ft	Frequency of	Rake score frequency per species				Plant Dominance
Species	Occurrence	0	1	3	5	
common coontail	45.5	54.5	9.1	18.2	18.2	30.9
eel grass	9.1	90.9	0.0	0.0	9.1	1.8

Common coontail was present at the highest percentage of sample sites (56.7%) and had the highest plant dominance rating. Chara and eel grass were both present at 26.7% of sample sites. Location and density of eel grass is illustrated in Figure 12. Eurasian watermilfoil was collected at four sites and had a rake score of 1 at each of those sites (Figure 13). Curlyleaf pondweed was collected at a single site in the southern part of the lake (Figure 14).

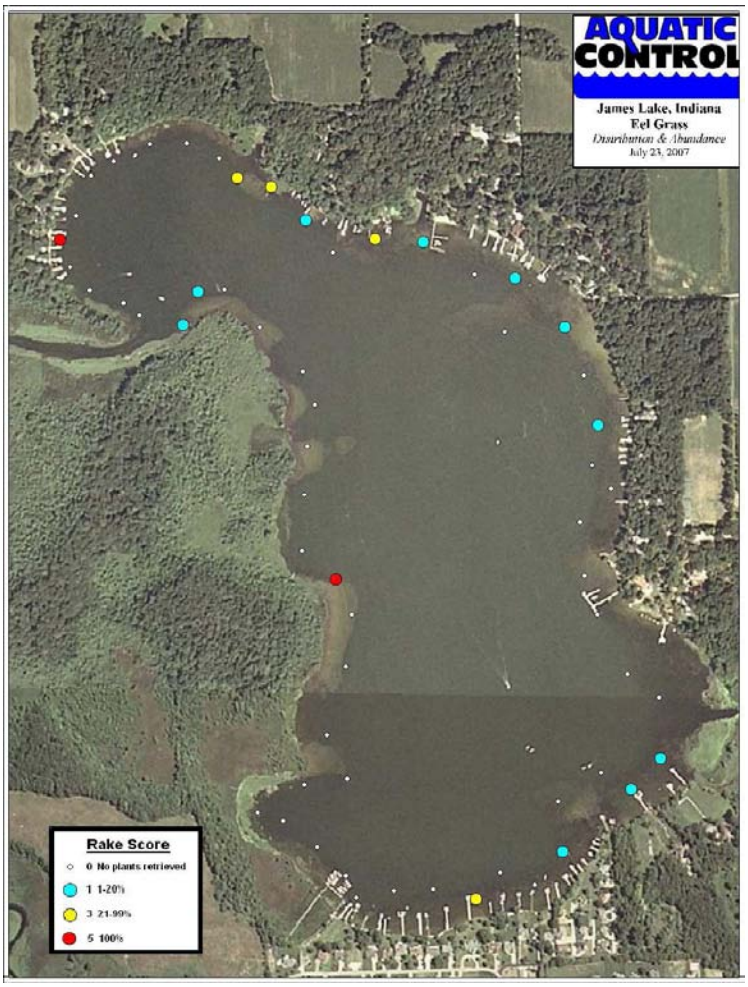

Figure 12. James Lake, eel grass distribution and abundance, July 23, 2007.

Figure 13. James Lake, Eurasian watermilfoil distribution and abundance, July 23, 2007.

Figure 14. James Lake, curlyleaf pondweed distribution and abundance, July 23, 2007.

2.4 Plant Sampling Discussion

LTPOA membership includes residents from all three lakes in the Tippecanoe Chain. These lakes are all connected to one another, but there are differences in water quality, average depth, and shoreline development. These differences lead to some variation in plant communities, and thus the plant sampling and sampling discussion focuses on the individual lakes.

2.4.1 Oswego Lake Sampling Discussion

One of the primary goals of the vegetation management plan is to reduce nuisance conditions created by invasive species. Oswego Lake has a higher percentage of shallow areas when compared to the other two lakes, so it tends to have a higher incidence of nuisance vegetation problems. This fact was evident during the April curlyleaf mapping. Oswego Lake already had nuisance levels of curlyleaf pondweed at or near the surface on April 23, while curlyleaf in the other lakes was typically 2-3 feet below the surface. Once the curlyleaf was controlled, Eurasian watermilfoil became the primary nuisance species. Both of these species tend to grow across entire bays within Oswego Lake as illustrated by the photo below (Figure 15).

Figure 15. Photo taken of curlyleaf pondweed and Eurasian watermilfoil beds in Oswego Lake, May 22, 2006.

Over the last five years, Oswego Lake has received a large percentage of LTPOA sponsored selective vegetation treatments. There appears to have been a significant

decline in Eurasian watermilfoil abundance on Oswego Lake since the spring of 2004 (Figure 16). This year's Tier II survey was the first one not to detect any milfoil. This may be the result of actively treating Eurasian watermilfoil with systemic herbicides.

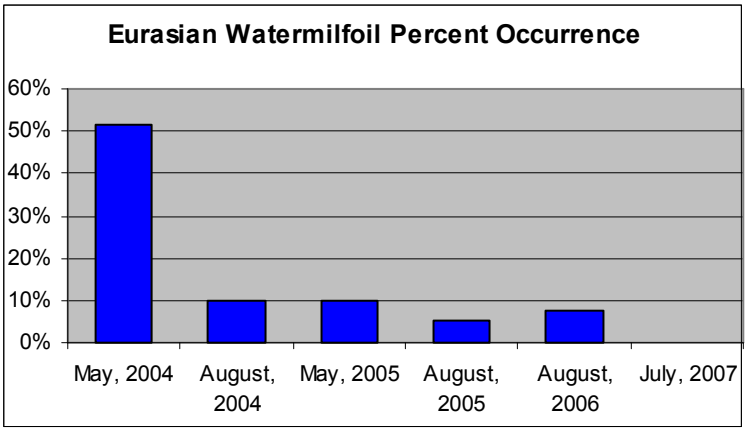

Figure 16. Oswego Lake, Eurasian watermilfoil percent occurrence in the last six surveys.

Curlyleaf pondweed has historically been a spring and early summer nuisance in Oswego Lake, especially in the shallow areas along the western shoreline. This season was the first season that this species was not detected in the summer sampling (Figure 17). This may be due to the early season curlyleaf treatment which included large areas of Oswego Lake. Since curlyleaf is much less abundant in the summer, a spring Tier II survey should be included next season. This should allow managers a better tool for tracking the long-term effects of the early season treatments.

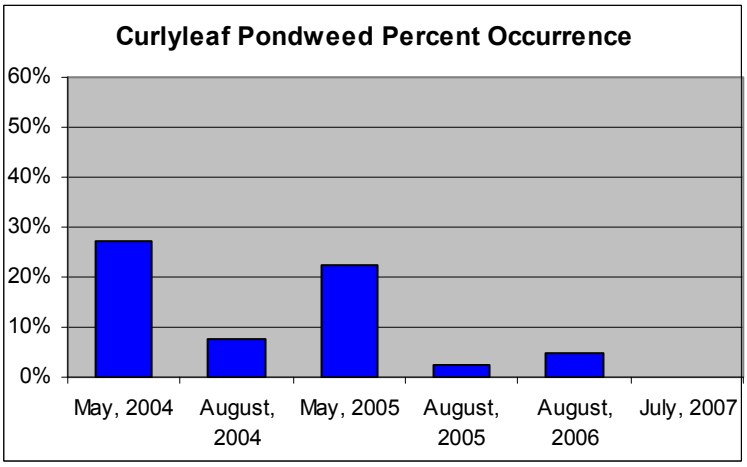

Figure 17. Oswego Lake, curlyleaf pondweed percent occurrence in the last six surveys.

Another goal of the plan is to maintain the abundance and diversity of native vegetation. It is theorized that using selective controls on invasive species should open up habitat for allowing native vegetation to increase in abundance. Over the last several years the mean number of native species per site and percentage of sites with vegetation has increased or stayed the same, but this season there was a slight decrease in these metrics (Figures 18

& 19). The reason for the decrease is not clear. It is important to continue monitoring this plant population in order to detect any long-term positive or negative trends in the native plant population.

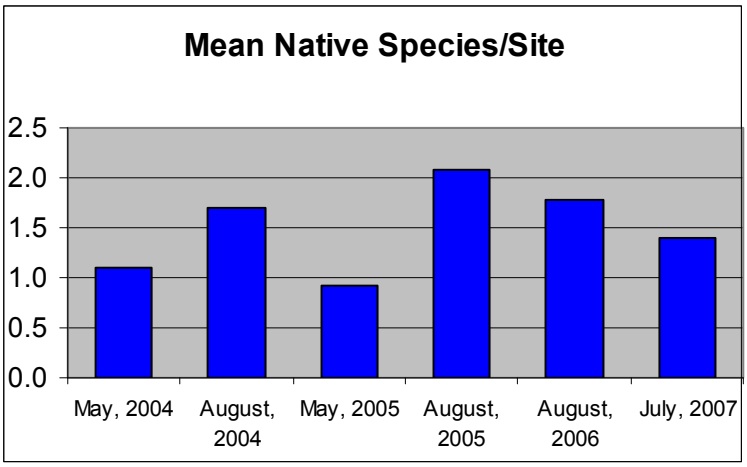

Figure 18. Oswego Lake, comparison of the number of the mean number of native species per site in the last six surveys.

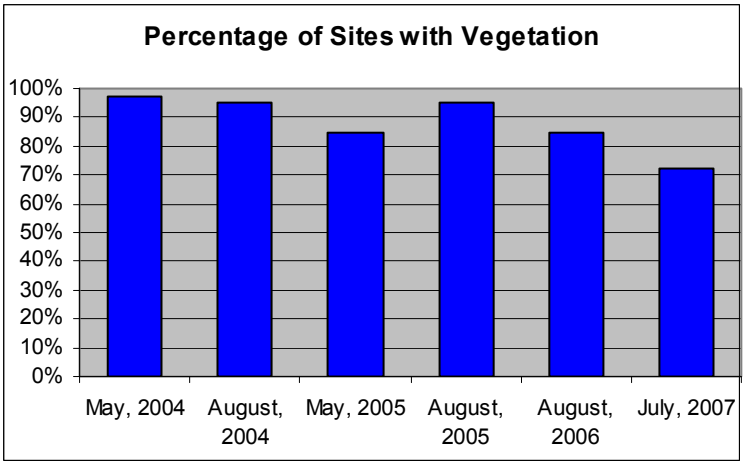

Figure 19. Oswego Lake, comparison of the percentage of sites with vegetation in the last six surveys.

Table 4 compares the frequency of occurrence of individual species collected during the last six surveys. Species that were collected in past surveys but not in the 2007 survey include Eurasian watermilfoil, curlyleaf pondweed, slender naiad, small pondweed, American elodea, southern naiad, largeleaf pondweed, northern watermilfoil, variable watermilfoil, whorled watermilfoil, horned pondweed, and common bladderwort. With the exception of Eurasian watermilfoil, curlyleaf pondweed, and slender naiad, most of these species previously occurred at less than 10% of sites. Variable pondweed, common coontail, Chara and eel grass decreased in percent occurrence compared to past surveys while Illinois pondweed, flatstem pondweed, and sago pondweed all increased.

Table 4. Percent occurrence of species in Oswego Lake in the last six Tier II surveys completed by Aquatic Control Inc.

Species	% of survey sites (5/04)	% of survey sites (8/04)	% of survey sites (5/05)	% of survey sites (8/05)	% of survey sites (8/06)	% of survey sites (7/07)
Eurasian watermilfoil	51.5%	10.0%	11.4%	5.4%	7.5%	
curlyleaf pondweed	27.3%	7.5%	25.7%	2.7%	5.0%	
common coontail	57.6%	50.0%	28.6%	37.8%	45.0%	40.0%
Chara	21.2%	35.0%	31.4%	51.4%	30.0%	15.0%
Slender naiad		7.5%		5.4%	12.5%	
sago pondweed		17.5%		13.5%	5.0%	20.0%
small pondweed				8.1%		
eel grass	12.1%	37.5%		59.5%	55.0%	37.5%
American elodea		2.5%			5.0%	
southern naiad				2.7%		
flatstem pondweed	3.0%	5.0%	25.7%	8.1%	2.5%	5.0%
Richardson's pondweed		5.0%	5.7%	8.1%	7.5%	7.5%
largeleaf pondweed				2.7%		
variable pondweed	12.1%				7.5%	2.5%
northern watermilfoil				5.4%		
variable milfoil					2.5%	
whorled milfoil			14.3%	5.4%		
spiny naiad		5.0%		13.5%	2.5%	2.5%
horned pondweed	3.0%					
common bladderwort				2.7%		
Illinois pondweed		5.0%			2.5%	10.0%

2.4.2 Lake Tippecanoe Sampling Discussion

Lake Tippecanoe is the deepest natural lake in Indiana. This fact limits the amount of nuisance vegetation growth. However, there are dense beds of vegetation growing near shore and in high-use areas. Typically, curlyleaf pondweed and Eurasian watermilfoil are the primary nuisance species in the spring and early summer while native eel grass is the primary nuisance submersed species in the summer. In addition to the eel grass, mats of filamentous bluegreen algae identified as *Lyngbya wollei* tend to create nuisance conditions in the eastern side of Lake Tippecanoe and likely limit beneficial submersed vegetation growth. Since 2003, the focus of LTPOA sponsored controls has been on Eurasian watermilfoil with some spot treatment on eel grass. The milfoil treatments were completed with Renovate herbicide in order to selectively control this plant while allowing native vegetation to replace the nuisance exotic species. These treatments were completed in order to meet the plant management goals of the Association, which are to reduce nuisance conditions caused primarily by exotic species, while preserving and enhancing the native plant community. There appears to have been a decline in Eurasian watermilfoil abundance on Lake Tippecanoe since the spring of 2004 (Figure 20). This may be a result of actively treating Eurasian watermilfoil with systemic herbicides. The reduction in Eurasian watermilfoil may be having a positive effect on the abundance of native plant species. This season there was a slight decrease in the percent occurrence of

Eurasian watermilfoil following a slight increase last season. Overall, milfoil levels remain well below the levels documented prior to initiation of the more aggressive selective milfoil controls and below the 10% percent maximum abundance goal.

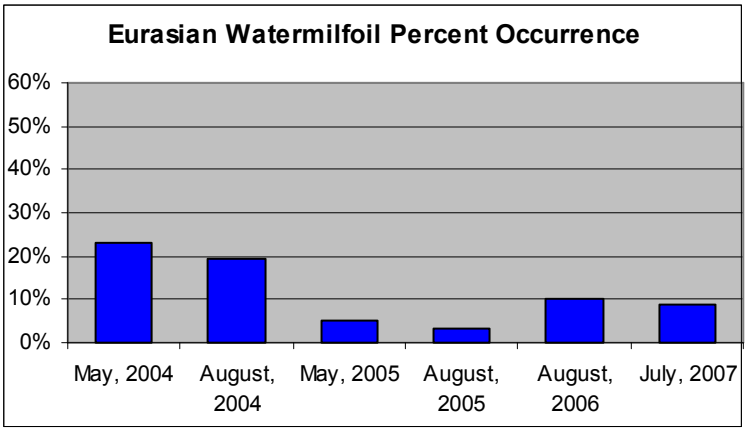

Figure 20. Lake Tippecanoe, Eurasian watermilfoil percent occurrence in the last six surveys.

In previous surveys curlyleaf pondweed has been abundant in the shallow areas of Lake Tippecanoe in the spring and early summer. This season an early season treatment was completed on curlyleaf pondweed, and for the first year since sampling began no curlyleaf was detected. Figure 21 illustrates the trends in curlyleaf pondweed over the last four seasons. Keep in mind that curlyleaf pondweed typically decreases in abundance after July 1. An April Tier II survey should also be completed on Lake Tippecanoe in order to assess the long-term effectiveness of the early season curlyleaf treatments.

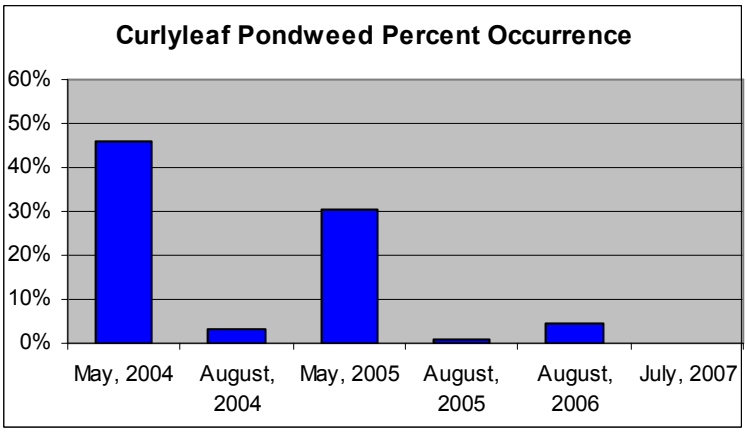

Figure 21. Lake Tippecanoe, curlyleaf pondweed percent occurrence in the last six surveys.

It is important to control invasive species while limiting the negative impacts on the native plant community. This has been achieved by using selective or early season treatments that are designed to target invasive plants. It appears that the plant community metrics have varied little since controls have been initiated (Figure 22 & 23).

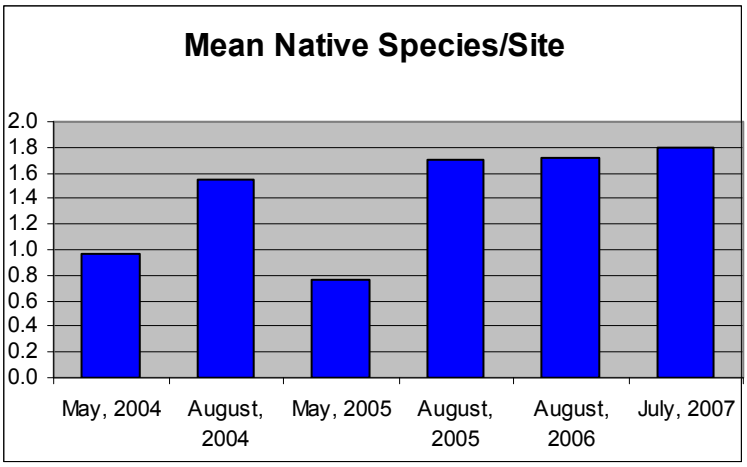

Figure 22. Lake Tippecanoe, comparison of the number of native species collected per site in the last six surveys.

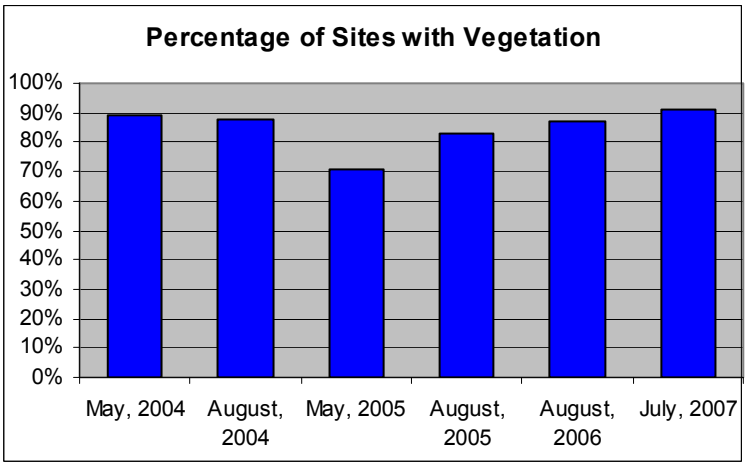

Figure 23. Lake Tippecanoe, percentage of sites with vegetation in the last six surveys.

Eel grass continues to be the dominant submersed summer species in Lake Tippecanoe. It appears that eel grass percent occurrence has changed little over the last four summer surveys (Table 5). This species is desired by fisheries and wildlife biologist as excellent fish cover and food for waterfowl. Understandably, there are restrictions on the amount of treatment that can be completed on this species. Several other species have varied in percent occurrence over the last four seasons. Species that were collected in last summer's survey but were not collected this season include curlyleaf pondweed, leafy pondweed, northern watermilfoil, variable watermilfoil, whorled watermilfoil, and spiny naiad. Southern naiad, flatstem pondweed, and Illinois pondweed were collected this season, but not in last year's surveys. These species were all collected at less than 10% of sample sites, so the variation in surveys may be due to their small populations.

Table 5. Percent occurrence of species in Lake Tippecanoe in the last six Tier II surveys completed by Aquatic Control Inc.

Species	% of survey sites (5/04)	% of survey sites (8/04)	% of survey sites (5/05)	% of survey sites (8/05)	% of survey sites (8/06)	% of survey sites (7/07)
Eurasian watermilfoil	22.9%	18.3%	5.3%	3.4%	10.0%	9.0%
curlyleaf pondweed	45.7%	3.4%	31.6%	0.8%	4.4%	
common coontail	13.6%	26.1%	17.5%	26.9%	35.6%	36.0%
Chara	30.7%	23.5%	20.2%	18.5%	25.6%	37.1%
Slender naiad		5.9%		1.7%	4.4%	1.1%
sago pondweed		10.9%		10.1%	5.6%	13.5%
small pondweed				0.8%		
eel grass	12.9%	61.3%	3.5%	58.0%	55.6%	58.4%
American elodea	0.7%		0.9%	0.8%	3.3%	2.2%
southern naiad				3.4%		1.1%
leafy pondweed					5.6%	
flatstem pondweed	19.3%	6.7%	22.8%	11.8%		12.4%
Richardson's pondweed		9.2%	4.4%	7.6%	10.0%	4.5%
variable pondweed	16.4%	3.4%			2.2%	4.5%
northern watermilfoil				11.8%	4.4%	
variable milfoil					1.1%	
whorled milfoil	0.7%		8.8%		1.1%	
spiny naiad					6.7%	
water stargrass	0.7%	5.0%	2.6%	16.0%	11.1%	6.7%
horned pondweed	1.4%					
common bladderwort	0.7%					
Illinois pondweed		1.7%		2.5%		1.1%

2.4.3 James Lake Sampling Discussion

In 2003 and 2004, there was very little impairment on James Lake created by nuisance exotic species, to the point that no LTPOA sponsored treatments were completed (Aquatic Control only treated milfoil in the most impaired areas due to a limited LTPOA budget, James Lake had milfoil but not to the extent of the other two lakes). However, in 2005 it appeared that the lack of treatments allowed Eurasian watermilfoil to spread, and several areas of the lake were treated with Renovate herbicide in 2005 and 2006. This season milfoil was sparse in the spring sampling, so a smaller area required treatment. The 2007 Tier II sampling collected milfoil at four sites with a rake score of 1, so the percent occurrence of milfoil increased this season compared to the last two surveys. Despite this season's increase in percent occurrence, milfoil was not at a nuisance level and the treatments appear to be having a positive effect on reducing Eurasian watermilfoil abundance over the last three seasons (Figure 24).

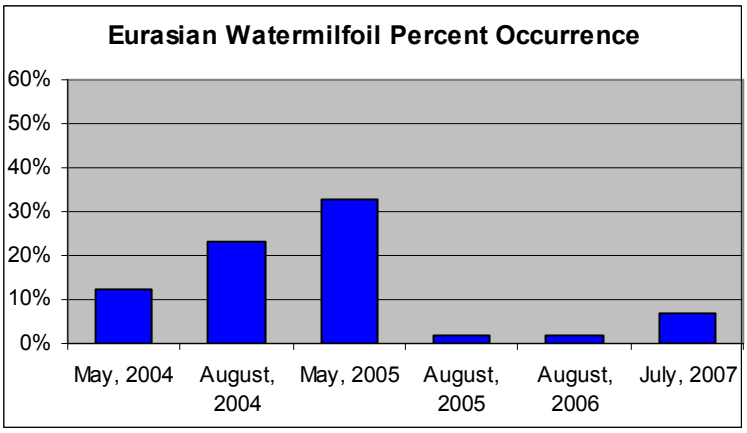

Figure 24. James Lake, Eurasian watermilfoil percent occurrence in the last six surveys.

Curlyleaf pondweed was abundant in James Lake this spring, but typically does not show up during the summer surveys. This season curlyleaf was detected at a single site (Figure 25). Much like the other two lakes it is important to initiate early spring Tier II surveys in order to document any potential long-term control of this species.

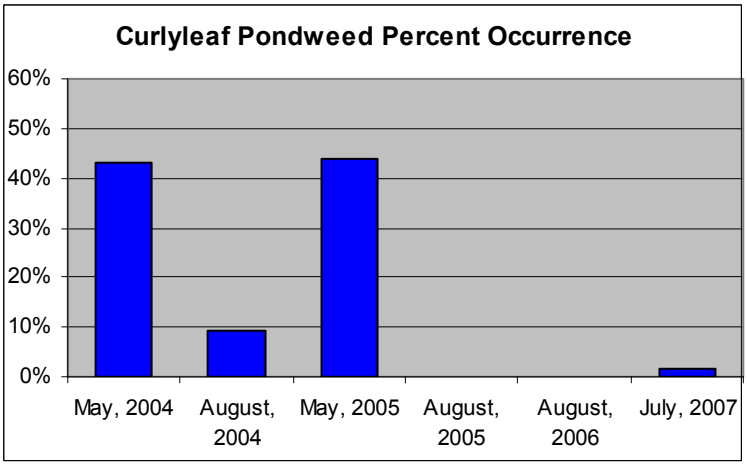

Figure 25. James Lake, curlyleaf pondweed percent occurrence in the last six surveys.

According to the Tier II surveys, James Lake has experienced little change in native plant abundance over the last four years (Figure 26 & 27). There have been some differences in the percent occurrence of individual species (Table 6). Prickly coontail, American elodea, leafy pondweed, water stargrass, white water buttercup, and brittle naiad were collected last year, but not collected in this year's survey. Spiny naiad and curlyleaf pondweed were collected this season but not in last year's survey. All of these species were at or below 10% occurrence, so variation may be due to the small populations. The only species to vary by more than 10% percent was Chara which increased from being collected 15.0% of sites in 2006 to 26.7% this season.

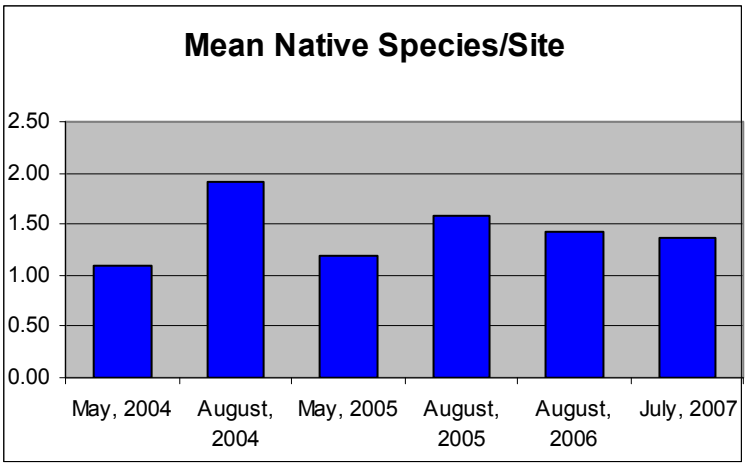

Figure 26. James Lake, mean number of species collected per site in the last six surveys.

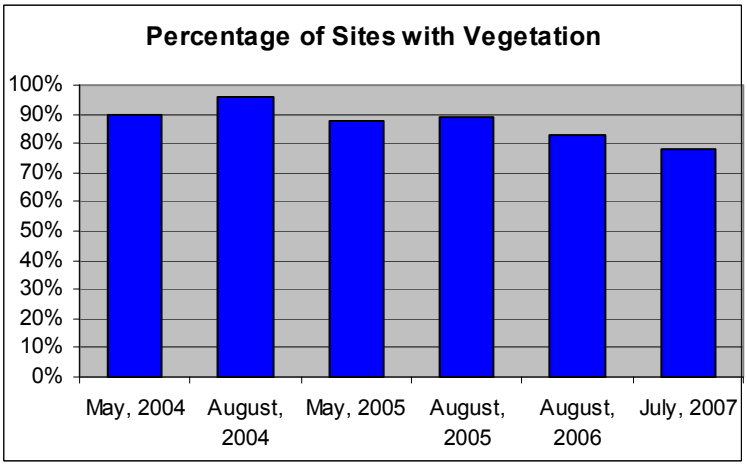

Figure 27. James Lake, percentage of sites with vegetation in the last six surveys.

Table 6. Percent occurrence of species in James Lake in the last six Tier II surveys completed by Aquatic Control Inc.

Species	% of survey sites (5/04)	% of survey sites (8/04)	% of survey sites (5/05)	% of survey sites (8/05)	% of survey sites (8/06)	% of survey sites (7/07)
Eurasian watermilfoil	12.2%	23.4%	36.2%	1.6%	1.7%	6.7%
curlyleaf pondweed	43.2%	9.4%	48.3%			1.7%
common coontail	43.2%	57.8%	48.3%	54.7%	61.7%	56.7%
Chara	36.5%	35.9%	36.2%	28.1%	15.0%	26.7%
prickly coontail					1.7%	
Slender naiad		15.6%		12.5%	8.3%	10.0%
sago pondweed		6.3%			6.7%	3.3%
small pondweed				1.6%		
eel grass	1.4%	42.2%	1.7%	37.5%	18.3%	26.7%
American elodea	1.4%	4.7%	17.2%	6.3%	6.7%	
southern naiad				3.1%		
leafy pondweed		3.1%			1.7%	
flatstemmed pondweed	18.9%	9.4%	20.7%	4.7%	6.7%	
Richardson's pondweed				1.6%	1.7%	
large leaf pondweed	1.4%					
variable pondweed	2.7%	6.3%				
northern watermilfoil				3.1%		
whorled milfoil			5.2%	1.6%		
spiny naiad		1.6%				1.7%
water stargrass		6.3%	1.7%	3.1%	3.3%	
horned pondweed	4.1%					
common bladderwort		1.6%				
bur marigold	1.4%					
brittle naiad					10.0%	
white water buttercup					1.7%	

3.0 2007 VEGETATION CONTROL

In general, the goal of the vegetation management plan is to control nuisance aquatic species, with a focus on exotic nuisance plants, while preserving and enhancing beneficial native vegetation. From 2003-2005, LTPOA funded treatment of Eurasian watermilfoil in main lake areas. Treatment areas were selected by Aquatic Control plant managers following spring surveys. Only the densest areas of milfoil were treated (ideally, LTPOA would fund the treatment of all areas of milfoil, but due to a limited budget it was left up to Aquatic Control to select the most impaired areas for treatment). In 2003 and 2004 these treatments focused primarily on Oswego Lake with some scattered areas in Lake Tippecanoe. James Lake was not treated in 2003 and 2004, even though there was some milfoil present. In 2003 and 2004 it was determined that Oswego and Tippecanoe had more impaired areas. By the 2005 spring survey, it became apparent that some long-term control was being achieved on Oswego and Lake Tippecanoe. There were still some small nuisance patches, but overall there was a significant reduction in Eurasian watermilfoil density and abundance. However, milfoil was rapidly spreading in James Lake where no treatments had been completed. In 2005, James Lake received the largest majority of treatment. In 2006, LTPOA received a grant from the LARE program to complete treatment of Eurasian watermilfoil. A total of 37 acres of Eurasian

watermilfoil was treated in 2006. Oswego Lake received the most treatment (19 acres), followed by Tippecanoe (10 acres), and James (8 acres). Renovate herbicide was used in all of the milfoil treatments. In addition, LTPOA contracted Aquatic Control to complete treatment to 7.5 acres of eel grass in Lake Tippecanoe.

In 2007, LTPOA requested a grant for an early season treatment of up to 104 acres of curlyleaf pondweed along with 34 acres of Eurasian watermilfoil. Also requested were funds for the plant sampling and plan update. LTPOA received a grant for the plant sampling and plan update along with funds for treatment of milfoil. LTPOA decided to go ahead and fund the first year of curlyleaf treatments on the lake. Curlyleaf beds were mapped out on April 23 and treatment was completed on April 30 to 104 acres of curlyleaf pondweed (Figure 28). A total of 14.32 acres was treated on Oswego Lake, 20.82 acres on James Lake, and 68.86 acres on Lake Tippecanoe. The treatment was completed early in the year in order to control curlyleaf before turions were formed, reduce damage to native plants, and in order to reduce the amount of nutrients released from the plants (treating before the plants reach peak biomass should reduce the amount of dead plant material that could break down and potentially release nutrients into the water column). Aquathol K (active ingredient: endothal) was used in the treatment at a rate of 1.0 ppm. The treatment successfully controlled curlyleaf pondweed in the lakes. Some dead stems remained in the eastern end of Lake Tippecanoe, but dropped out in May.

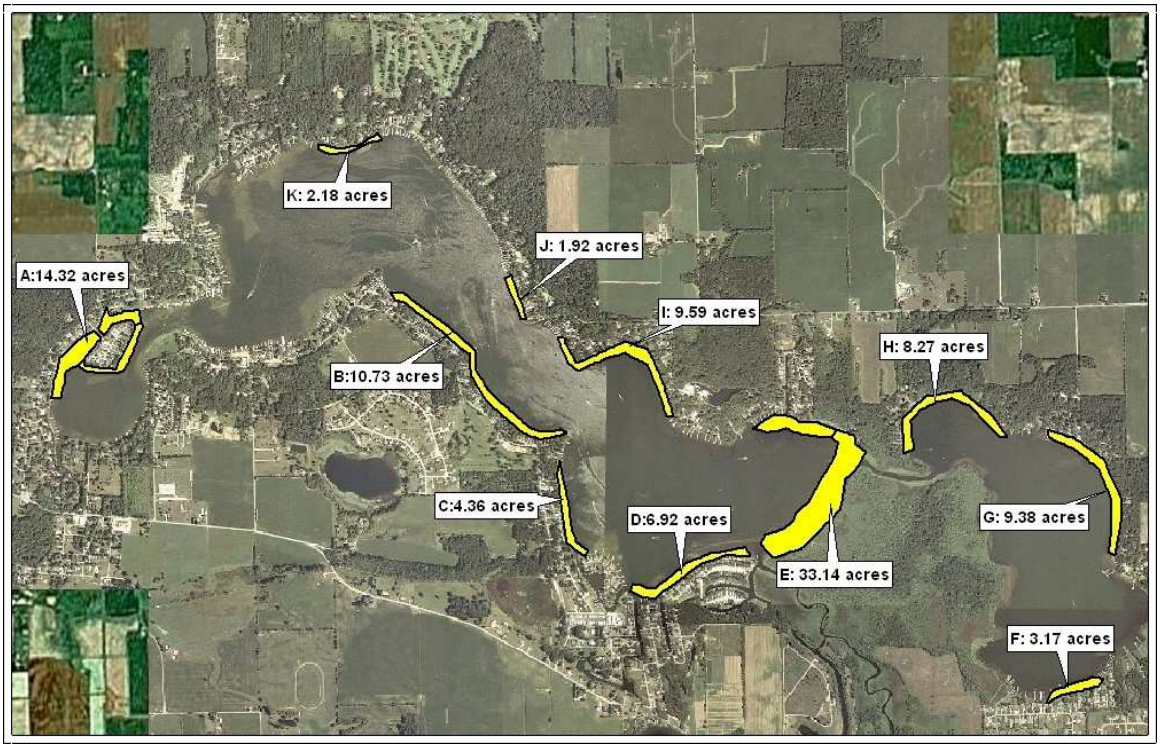

Figure 28. Lake Tippecanoe Chain curlyleaf pondweed treatment areas, April 30, 2007.

Eurasian watermilfoil treatment areas were mapped on May 31, 2007. A total of 40.7 acres of milfoil was mapped within the three lakes of which 22.1 acres was considered dense. Funds were available for treatment of only 34 acres, so the decision was made to

treat the densest beds of milfoil and areas that had the highest potential of spread. A total of 34 acres of milfoil was treated on June 12, 2007 (Figure 29 & 30). A total of 15.8 acres was treated on Tippecanoe, 5.9 acres on James, and 12.3 acres on Oswego. The treatment was completed using Renovate 3 herbicide (active ingredient: triclopyr) at a rate of 1.25-1.5 ppm. The treatment effectively controlled milfoil in the targeted areas.

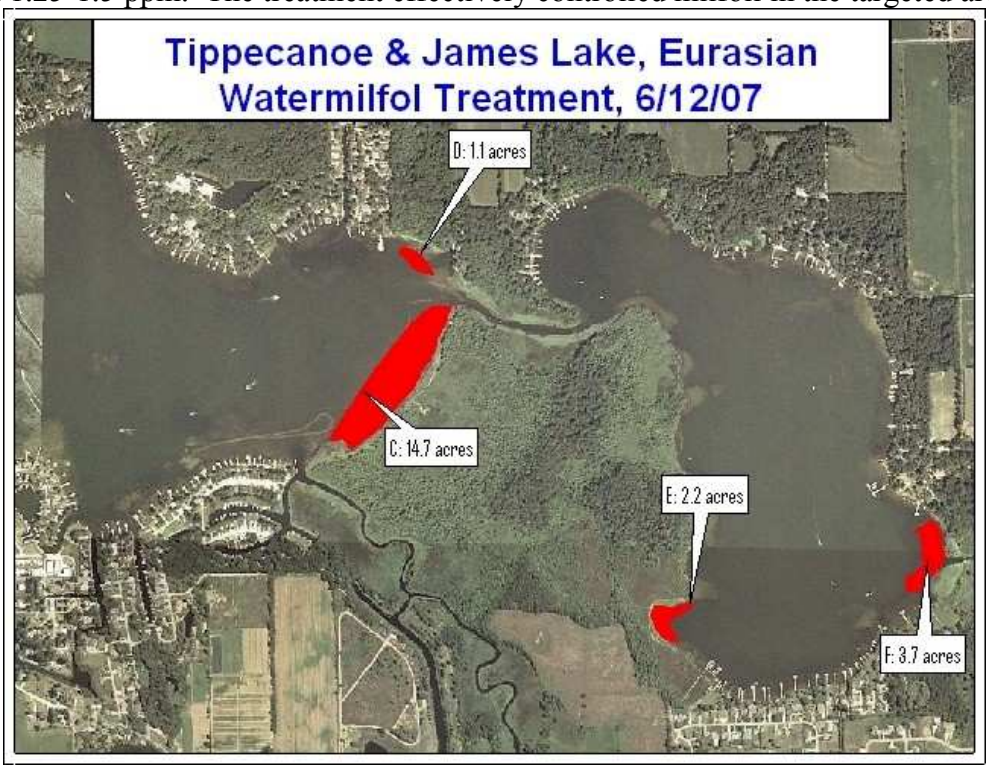

Figure 29. Lake Tippecanoe and James Lake Eurasian watermilfoil treatment areas, June 12, 2007.

Figure 30. Oswego Lake Eurasian watermilfoil treatment areas, June 12, 2007.

LTPOA did not sponsor any treatment of eel grass this season due to budget shortfalls. By late summer eel grass was considered a nuisance by many residents on Lake Tippecanoe. Selected areas of eel grass should be considered for treatment in 2008 if LTPOA budget allows.

4.0 ACTION PLAN AND BUDGET UPDATE

In 2007, LTPOA made a large investment in an effort to control curlyleaf pondweed. In order for this investment to pay off, curlyleaf should be treated for at least two more consecutive seasons. These repeated treatments are needed in order to exhaust curlyleaf turion supplies. These treatments should be completed to the same areas as the 2007 application. In addition, it would be beneficial to complete a spring Tier II survey prior to application. These survey results can be compared to the 2005 and 2006 spring surveys in order to assess the long-term effectiveness of the applications. If nothing were done in 2008 for curlyleaf pondweed control, the 2007 treatments would simply have benefited the lake for the single season.

From 2003-2005 LTPOA took on the responsibility of reducing the negative impacts caused by Eurasian watermilfoil. In 2006 LARE funded treatment of 37 acres of Eurasian watermilfoil and in 2007 LARE funded treatment of 34 acres of milfoil. There has been a steady decline in Eurasian watermilfoil since the inception of the treatment program in 2003. Eurasian watermilfoil has the ability to quickly recolonize areas, so treatments should be continued so that it doesn't return to pre-2003 levels. Some milfoil will likely return in 2008. Eurasian watermilfoil should be treated anywhere it occurs within the chain of lakes It is estimated that up to 34 acres may require treatment on the Tippecanoe Chain in 2008. Actual treatment areas should be determined following a visual survey that should be completed in the spring. The liquid form of Renovate should be used to treat areas larger than 5 acres with a average depth of less than 5 feet. Either Renovate granular or granular 2,4-D should be used in areas less than 5 acres or with an average depth of over 5 feet.

Eel grass is a beneficial native species that typically reaches its maximum density in late summer. This species has created some nuisance conditions in the three lakes, especially Lake Tippecanoe. LTPOA has treated some of the most impaired areas when funds are available. As long as proper permits are obtained, traditional treatment areas can be treated without IDNR inspection. These traditional areas are illustrated in Figure 31. If LTPOA wishes to expand out of these areas additional inspections will be required (the permit and permit map contain possible treatment areas, but these areas will only be treated if needed and upon IDNR inspection and approval). In Lake Tippecanoe, IDNR wishes to maintain eel grass at or above 50% of sample sites in the 0-5 ft depth range (eel grass occurred at 73% of sites in this depth range in the summer Tier II survey).

Figure 31. Lake Tippecanoe, traditional eel grass treatment areas.

Listed below in Table 7 is a budget estimate for vegetation controls over the next four seasons. The potential LARE funded items include the curlyleaf pondweed treatment, Eurasian watermilfoil treatment, and continued vegetation sampling (early spring Tier II survey and treatment map and summer Tier II survey). LTPOA should request $54,590 from the LARE program. Specifically, $33,800 for early season curlyleaf treatment to 104 acres, $14,790 for treatment of up to 34 acres of Eurasian watermilfoil, and $6,000 for plant sampling and plan updates. LARE may not have enough funds for treatment of curlyleaf pondweed. If LTPOA wishes to continue the early season curlyleaf treatment then they may have to come up with approximately $33,800. Treatment of eel grass will not be funded by LARE.

Table 7. Four year budget estimate for plant management on the Tippecanoe Chain.

	2008	2009	2010	2011
Curlyleaf pondweed treatment:	$33,800	$33,800	$33,800*	-
Eurasian watermilfoil treatment:	$14,790	$13,000	$10,000	$7,000
Eel grass treatment:	$4,000	$4,250	$4,500	$4,750
Plant sampling and plan update:	$6,000	$6,000	$6,000	$6,000
Total potentially funded by LARE:	**$54,590**	**$52,550**	**$48,300**	**$17,750**
Total funded by LTPOA if full grant is awarded (does not include 10% match):	**$4,000**	**$4,250**	**$4,500**	**$4,750**

*May not need 2010 curlyleaf treatment

5.0 PUBLIC INVOLVEMENT

A public meeting was held September 13, 2007 at the North Webster Community Center. This meeting was designed to gain further input from lake users; to educate lake users of the 2007 vegetation management activities, and to inform users of potential vegetation management plan updates. Approximately 35 individuals were in attendance and 31 of those individuals filled out a lake user survey form. The results of the survey are outlined in Table 8. All survey participants were lake property owners of which 57% lived on Lake Tippecanoe, 32% lived on James, and 11% lived on Oswego. Eighty-four percent of survey participants have lived on the lakes for more than 10 years. Ninety-seven percent of those surveyed used the lake for boating, 94% swimming, 61% also used the lake for fishing, and 26% for irrigation. Survey respondents indicated that 32% believed poor water quality was a problem, 35% too many jet skis, 22% overuse by non-residents, 19% believed pier funneling was a problem, and 58% believed nuisance plants were a problem. Most indicated that nuisance vegetation was a problem in the lake and were in favor of continued controls. However, when asked if they were satisfied with this season's LARE funded controls only 32% said yes while 46% didn't answer this question. It was apparent that prior to the meeting few were aware of what controls were completed on the lake and where they were completed. The comments also reflected that many were frustrated with the eel grass problem and the fact that LARE would not fund treatment. The eel grass issue was the primary discussion point during the public meeting. Another frequently occurring comment was the fact that lots around the lakes needed to be on a sewer system.

Table 8. Lake Tippecanoe survey questions and responses, September, 13, 2007.

Lake Tippecanoe User Survey 9/12/07		
Are you a lake property owner?	Yes: 100%	No: 0%
Which lake do you live on?	Tippe: 57%	James: 32%
	Oswego: 11%	
Are you currently a member of your lake association?	Yes: 94%	No: 6%
How many years have you been at the lake?	2 or Less: 3%	5 to 10: 13%
	2 to 5: 0%	Over 10: 84%
How do you use the lake (mark all that apply)	94% Swimming	26% Irrigation
	97% Boating	0% Drinking water
	61% Fishing	0% Other _____
Do you have aquatic plants at your shoreline in nuisance quantities?	Yes: 87% No: 3% No Response: 10%	
Does aquatic vegetation interfere with your use or enjoyment of the lake?	Yes: 81% No: 16% No Response: 3%	
Does the level of vegetation in the lake affect your property values?	Yes: 68% No: 16% No Response: 16%	
Are you in favor of continuing efforts to control vegetation on the lake?	Yes: 90% No: 0% No Response: 10%	
Are you aware that the LARE funds will only apply to work controlling invasive exotic species, and more work may need to be privately funded?	Yes: 81% No: 10% No Response: 9%	
Were you satisfied with the results of the LARE funded invasive treatments this season?	Yes: 32% No: 22% No Response: 46%	
Mark any of these you think are problems on your lake:		
26% Too many boats access the lake		
35% Use of jet skis on the lake		
0% Too much fishing		
6% Fish population problem		
26% Dredging needed		
22% Overuse by nonresidents		
58% Too many aquatic plants		
0% Not enough aquatic plants		
32% Poor water quality		
19% Pier/funneling problem		

Another topic discussed at the public meeting was the recent discovery of hydrilla (*Hydrilla verticillata*) in Lake Manitou. Hydrilla is an invasive aquatic species that was originally discovered in Florida in the 1960's. There are many characteristics of hydrilla that make it a threat to Indiana waterways. This species can grow in lower light conditions than most native species, grows faster than most native species, and can shade out other species by forming a surface canopy. Hydrilla can be easily confused with native elodea. The best way to distinguish hydrilla from native elodea is that hydrilla typically has five leaves along each whorl along with visible serrated edges along the leaf margin (Figure 32). What makes controlling the spread of hydrilla difficult is the fact that it can be spread by fragments. **That is why it is vitally important that lake users remove all plants and sediment from their boats when entering and leaving the Tippecanoe Lakes.** More information about controlling the spread of hydrilla can be found at www.protectyourwaters.net.

Figure 32. Illustration of hydrilla on the left compared to native elodea on the right. Hydrilla typically contains five toothed leaves per whorl while native elodea typically has three leaves per whorl and the teeth are not visible on the leaves (Illustrations provided by Applied Biochemist).

The Association currently does a fine job of keeping members informed of Best Management Practices (BMP's) in their newsletter and during Association meetings. It will be important for the Association to continue to inform users of proper land management practices that have minimal negative impacts on the lakes water quality. This may include discouraging fertilizer use, not disposing of yard waste in or near the lake, and allowing natural vegetation to grow along the shoreline as opposed to concrete seawalls. Residents should also continue to be informed of the benefits of native

vegetation on fish populations and water quality. These items should continue to be reinforced in Association newsletters, websites, and at Association meetings.

6.0 REFERENCE CITED

IDNR. 2007. Procedure Manual for Surveying Aquatic Vegetation: Tier II Reconnaissance Surveys. IN Department of Natural Resources, Division of Fish and Wildlife.

7.0 APPENDIX UPDATE

7.1 2007 Sampling Data

Lake Tippecanoe Tier II Data

						Eurasian watermilfoil (*Myriophyllum spicatum*)	common coontail (*Ceratophyllum demersum*)	Chara (Chara spp.)	Slender naiad (*Najas flexilis*)	sago pondweed (*Potamogeton pectinatus*)	eel grass (*Vallisneria americana*)	American elodea (*Elodea canadensis*)	southern naiad (*Najas guadelupensis*)	flatstemmed pondweed (*Potamogeton zosteriformis*)	Richardson's pondweed (*Potamogeton richardsonii*)	variable pondweed (*Potamogeton gramineus*)	water stargrass (*Zosterella dubia*)	Illinois pondweed (*Potamogeton illinoensis*
Lake	Date	Latitude	Longitude	Depth	RAKE	MYSP2	CEDE4	CH?AR	NAFL	POPE6	VAAM3	ELCA7	NAGU	POZO	PORI2	POGR8	ZODU	POIL
Tippecanoe	7.23.07	41.328204	-85.777431	9.0	5		5											
Tippecanoe	7.23.07	41.328712	-85.775322	21.0	5		5											
Tippecanoe	7.23.07	41.329643	-85.773605	4.0	1			1										
Tippecanoe	7.23.07	41.330895	-85.771664	9.0	3		3				1							
Tippecanoe	7.23.07	41.33147	-85.769914	6.0	5	1	3	1			5			1				
Tippecanoe	7.23.07	41.330896	-85.768256	20.0	3		3											
Tippecanoe	7.23.07	41.330218	-85.766825	12.0	1		1											
Tippecanoe	7.23.07	41.329269	-85.765498	13.0	5						5						1	
Tippecanoe	7.23.07	41.328611	-85.764031	13.0	3	3	1											
Tippecanoe	7.23.07	41.328144	-85.762773	9.0	5		1				5	1					3	
Tippecanoe	7.23.07	41.327052	-85.762321	11.0	5						5						1	
Tippecanoe	7.23.07	41.326123	-85.76214	4.0	5			5			3							
Tippecanoe	7.23.07	41.325777	-85.761345	17.0	5		5											
Tippecanoe	7.23.07	41.324935	-85.760697	4.0	5			5			3							
Tippecanoe	7.23.07	41.324916	-85.759228	11.0	5					5	5							
Tippecanoe	7.23.07	41.324233	-85.758057	8.0	5			3			5							
Tippecanoe	7.23.07	41.324364	-85.756407	15.0	1		1											
Tippecanoe	7.23.07	41.323357	-85.756982	4.0	5			1		1	5							
Tippecanoe	7.23.07	41.322541	-85.756801	17.0	5		5				1							
Tippecanoe	7.23.07	41.321564	-85.757022	4.0	5		1				5			1				
Tippecanoe	7.23.07	41.320453	-85.756391	3.0	5					5	5							
Tippecanoe	7.23.07	41.319665	-85.755803	16.0	3		3											
Tippecanoe	7.23.07	41.318829	-85.755404	5.0	5			5			3			1				
Tippecanoe	7.23.07	41.319147	-85.753859	6.0	5	1	3				1			1				
Tippecanoe	7.23.07	41.318192	-85.753599	4.0	5			1			5				1		1	
Tippecanoe	7.23.07	41.317091	-85.753037	7.0	5						5							
Tippecanoe	7.23.07	41.316462	-85.751712	3.0	5			5								1		
Tippecanoe	7.23.07	41.318097	-85.750765	16.0	5		5											
Tippecanoe	7.23.07	41.317995	-85.748948	3.0	5			1		1	3							
Tippecanoe	7.23.07	41.319323	-85.748181	4.0	1						1							
Tippecanoe	7.23.07	41.319605	-85.746716	8.0	5		5											
Tippecanoe	7.23.07	41.31874	-85.745822	3.0	0													
Tippecanoe	7.23.07	41.319017	-85.743988	3.0	0													
Tippecanoe	7.23.07	41.320199	-85.744685	19.0	0													
Tippecanoe	7.23.07	41.320647	-85.742727	5.0	0													
Tippecanoe	7.23.07	41.321847	-85.740786	4.0	0													
Tippecanoe	7.23.07	41.323165	-85.74061	5.0	0													
Tippecanoe	7.23.07	41.323922	-85.742285	4.0	1						1							
Tippecanoe	7.23.07	41.32299	-85.743691	10.0	1		1											
Tippecanoe	7.23.07	41.323501	-85.745302	7.0	5	1	5			3	1							
Tippecanoe	7.23.07	41.323234	-85.746704	4.0	5						5							
Tippecanoe	7.23.07	41.322735	-85.747984	6.0	5						5							
Tippecanoe	7.23.07	41.323402	-85.74928	6.0	5						5							

Tippe Tier II Data Continued

Lake	Date	Latitude	Longitude	Depth	RAKE	Eurasian watermilfoil (*Myriophyllum spicatum*) MYSP2	common coontail (*Ceratophyllum demersum*) CEDE4	Chara (Chara spp.) CH?AR	Slender naiad (*Najas flexilis*) NAFL	sago pondweed (*Potamogeton pectinatus*) POPE6	eel grass (*Vallisneria americana*) VAAM3	American elodea (*Elodea canadensis*) ELCA7	southern naiad (*Najas guadalupensis*) NAGU	flatstemmed pondweed (*Potamogeton zosteriformis*) POZO	Richardson's pondweed (*Potamogeton richardsonii*) PORI2	variable pondweed (*Potamogeton gramineus*) POGR8	water stargrass (*Zosterella dubia*) ZODU	Illinois pondweed (*Potamogeton illinoensis* POIL
Tippecanoe	7.23.07	41.324056	-85.750354	4.0	5						5							
Tippecanoe	7.23.07	41.324681	-85.751587	3.0	5						5				1		1	
Tippecanoe	7.23.07	41.326352	-85.752094	6.0	5						5							
Tippecanoe	7.23.07	41.327405	-85.753172	8.0	5	3	1				5							
Tippecanoe	7.23.07	41.327247	-85.754867	18.0	5		5											
Tippecanoe	7.23.07	41.326891	-85.756155	9.0	5						5							
Tippecanoe	7.23.07	41.327524	-85.757309	4.0	5						5			1				
Tippecanoe	7.23.07	41.328492	-85.75848	7.0	1		1				1							
Tippecanoe	7.23.07	41.329071	-85.759699	16.0	1		1											
Tippecanoe	7.23.07	41.330139	-85.760535	5.0	5			1			5							
Tippecanoe	7.23.07	41.331405	-85.761159	15.0	0													
Tippecanoe	7.23.07	41.332729	-85.761634	15.0	5		5											
Tippecanoe	7.23.07	41.333843	-85.762297	22.0	0													
Tippecanoe	7.23.07	41.335093	-85.76355	5.0	5			1		1	3					1		
Tippecanoe	7.23.07	41.336051	-85.764806	4.0	3			1	1		1					3		
Tippecanoe	7.23.07	41.336982	-85.765942	9.0	5		3				5	1		1			1	
Tippecanoe	7.23.07	41.337768	-85.767387	3.0	5			5			5			1	1			
Tippecanoe	7.23.07	41.337833	-85.768485	4.0	5			1		3	5			1				
Tippecanoe	7.23.07	41.337164	-85.76911	3.0	5			3			5			1				
Tippecanoe	7.23.07	41.336971	-85.770222	7.0	1						1							
Tippecanoe	7.23.07	41.336582	-85.770951	4.0	5			3			1		1			1		
Tippecanoe	7.23.07	41.336912	-85.77221	5.0	5			5			5							
Tippecanoe	7.23.07	41.337313	-85.773449	4.0	5			5		1								
Tippecanoe	7.23.07	41.336731	-85.773796	13.0	3		3											
Tippecanoe	7.23.07	41.336419	-85.775075	3.0	5			5			1							
Tippecanoe	7.23.07	41.33581	-85.774817	22.0	1		1											
Tippecanoe	7.23.07	41.335506	-85.775789	14.0	5		5											
Tippecanoe	7.23.07	41.335448	-85.776939	4.0	5			3		1	3							
Tippecanoe	7.23.07	41.33601	-85.778217	3.0	5			5			1							
Tippecanoe	7.23.07	41.335332	-85.779154	4.0	3			3			1							
Tippecanoe	7.23.07	41.334693	-85.77832	12.0	5	1	5											
Tippecanoe	7.23.07	41.334122	-85.779603	8.0	5			5			1							1
Tippecanoe	7.23.07	41.333718	-85.778437	17.0	5		5											
Tippecanoe	7.23.07	41.332739	-85.778804	4.0	3					3								
Tippecanoe	7.23.07	41.332138	-85.778065	19.0	5		5											
Tippecanoe	7.23.07	41.33144	-85.77817	4.0	5			3			3							
Tippecanoe	7.23.07	41.330687	-85.77821	5.0	5			5			1			1				
Tippecanoe	7.23.07	41.329843	-85.77831	4.0	1	1		1										
Tippecanoe	7.23.07	41.330266	-85.779611	4.0	5			5			3				1			
Tippecanoe	7.23.07	41.329785	-85.780509	11.0	3		3											
Tippecanoe	7.23.07	41.328625	-85.780055	3.0	5			1		3				1				
Tippecanoe	7.23.07	41.328168	-85.77868	16.0	1		1											
Tippecanoe	7.23.07	41.328303	-85.776432	4.0	5	1		1			5							
Tippecanoe	7.23.07	41.328593	-85.773864	4.0	3			3			1							
Tippecanoe	7.23.07	41.330159	-85.772536	3.0	1			1		1								
Tippecanoe	7.23.07	41.330761	-85.770773	3.0	5			5			5							

Oswego Lake Tier II Data

								Eurasian watermilfoil (*Myriophyllum spicatum*)	common coontail (*Ceratophyllum demersum*)	Chara (Chara spp.)	sago pondweed (*Potamogeton pectinatus*)	eel grass (*Vallisneria americana*)	flatstemmed pondweed (*Potamogeton zosteriformis*)	Richardson's pondweed (*Potamogeton richardsonii*)	variable pondweed (*Potamogeton gramineus*)	spiny naiad (*Najas marina*)	Illinois pondweed (*Potamogeton illinoensis*
Lake	Date	Latitude	Longitude	Design	Site	Depth	RAKE	MYSP2	CEDE4	CH?AR	POPE6	VAAM3	POZO	PORI2	POGR8	NAMA	POIL
Oswego	7/23/07	41.329775	-85.782915		141	3.0	5				5	1					1
Oswego	7/23/07	41.329647	-85.783899		142	6.0	0										
Oswego	7/23/07	41.329411	-85.785196		143	5.0	1			1		1					
Oswego	7/23/07	41.329092	-85.78401		144	6.0	5			1		3					5
Oswego	7/23/07	41.328427	-85.783947		145	4.0	3			1	3	1					
Oswego	7/23/07	41.327774	-85.784631		146	3.0	1		1			1					
Oswego	7/23/07	41.327084	-85.784789		147	5.0	3		1		1	1	1				
Oswego	7/23/07	41.326647	-85.784664		148	4.0	1					1					
Oswego	7/23/07	41.326238	-85.784699		149	7.0	1					1					
Oswego	7/23/07	41.326913	-85.785582		150	6.0	1		1				1				
Oswego	7/23/07	41.326409	-85.785756		151	14.0	1		1								
Oswego	7/23/07	41.326373	-85.786368		152	5.0	1		1		1						
Oswego	7/23/07	41.326313	-85.786356		153	15.0	0										
Oswego	7/23/07	41.326235	-85.787014		154	6.0	1		1		1						
Oswego	7/23/07	41.32627	-85.787475		155	19.0	0										
Oswego	7/23/07	41.32699	-85.787461		156	5.0	0										
Oswego	7/23/07	41.327913	-85.787409		157	6.0	5		5			1					
Oswego	7/23/07	41.326397	-85.788236		158	6.0	4					5					
Oswego	7/23/07	41.326128	-85.787942		159	18.0	1					1					
Oswego	7/23/07	41.32584	-85.788232		160	14.0	0										
Oswego	7/23/07	41.325445	-85.788554		161	18.0	1		1								
Oswego	7/23/07	41.325056	-85.788471		162	20.0	0										
Oswego	7/23/07	41.324637	-85.788667		163	15.0	3		3								
Oswego	7/23/07	41.324006	-85.788714		164	4.0	5			3		5				1	3
Oswego	7/23/07	41.324372	-85.787952		165	19.0	0										
Oswego	7/23/07	41.324301	-85.78712		166	22.0	0										
Oswego	7/23/07	41.323945	-85.786198		167	17.0	1		1								
Oswego	7/23/07	41.324006	-85.785377		168	15.0	3		3								
Oswego	7/23/07	41.324373	-85.784686		169	9.0	5		5			5					
Oswego	7/23/07	41.325016	-85.784228		170	17.0	3		3								
Oswego	7/23/07	41.325385	-85.783582		171	5.0	5			5	1						
Oswego	7/23/07	41.325709	-85.784274		172	19.0	1		1								
Oswego	7/23/07	41.326049	-85.784891		173	21.0	0										
Oswego	7/23/07	41.326254	-85.785211		174	15.0	0										
Oswego	7/23/07	41.326123	-85.78382		175	5.0	0										
Oswego	7/23/07	41.324531	-85.784173		176	4.0	3			3						1	
Oswego	7/23/07	41.323996	-85.787066		177	10.0	5		5			1		1			
Oswego	7/23/07	41.324112	-85.788063		178	5.0	5		5			3		1			
Oswego	7/23/07	41.327624	-85.783909		179	4.0	1				1			1			1
Oswego	7/23/07	41.328574	-85.783051		180	2.0	3				3						

James Lake Tier II Data

Lake	Date	Latitude	Longitude	Design	Site	Depth	RAKE	Eurasian watermilfoil (*Myriophyllum spicatum*)	curlyleaf pondweed (*Potamogeton crispus*)	common coontail (*Ceratophyllum demersum*)	Chara (Chara spp.)	Slender naiad (*Najas flexilis*)	sago pondweed (*Potamogeton pectinatus*)	eel grass (*Vallisneria americana*)	American elodea (*Elodea canadensis*)	flatstemmed pondweed (*Potamogeton zosteriformis*)	spiny naiad (*Najas marina*)
								MYSP2	POCR3	CEDE4	CHAR	NAFL	POPE6	VAAM3	ELCA7	POZO	NAMA
James	7/23/07	41.322327	-85.733135		271	6.0	5			1			5	1			
James	7/23/07	41.322978	-85.732155		272	21.0	0										
James	7/23/07	41.322295	-85.731323		273	3.0	3				3						
James	7/23/07	41.321508	-85.730298		274	18.0	5			5							
James	7/23/07	41.320924	-85.730016		275	18.0	0										
James	7/23/07	41.320177	-85.730186		276	3.0	0										
James	7/23/07	41.3193	-85.730257		277	21.0	0										
James	7/23/07	41.3183	-85.730305		278	14.0	5			5							
James	7/23/07	41.317778	-85.729503		279	5.0	5	1			1	1		5			
James	7/23/07	41.317156	-85.729125		280	5.0	1				1						
James	7/23/07	41.316232	-85.72927		281	9.0	1			1							
James	7/23/07	41.315013	-85.729715		282	21.0	0										
James	7/23/07	41.314229	-85.729243		283	8.0	3			3							
James	7/23/07	41.31412	-85.73025		284	6.0	1			1	1						
James	7/23/07	41.313629	-85.731376		285	3.0	3			3	1						1
James	7/23/07	41.313478	-85.730753		286	17.0	0										
James	7/23/07	41.313006	-85.729947		287	10.0	5			5							
James	7/23/07	41.312493	-85.729281		288	20.0	3			3							
James	7/23/07	41.312106	-85.729032		289	15.0	5			5							
James	7/23/07	41.31222	-85.728127		290	11.0	5			5							
James	7/23/07	41.312248	-85.727204		291	20.0	1			1							
James	7/23/07	41.312069	-85.726177		292	5.0	5	1		5	1	3		3			
James	7/23/07	41.312546	-85.725604		293	9.0	5			5							
James	7/23/07	41.31233	-85.724789		294	3.0	3		1			1				3	
James	7/23/07	41.312905	-85.724127		295	3.0	3	1						1		1	
James	7/23/07	41.313828	-85.724225		296	4.0	1									1	
James	7/23/07	41.31433	-85.723216		297	20.0	0										
James	7/23/07	41.314029	-85.722491		298	3.0	5				5			1			
James	7/23/07	41.314578	-85.721796		299	4.0	5	1		5				1			
James	7/23/07	41.315673	-85.721836		300	5.0	1			1							
James	7/23/07	41.316092	-85.722587		301	7.0	5			5							
James	7/23/07	41.317151	-85.723301		302	12.0	5			5							
James	7/23/07	41.317857	-85.723613		303	3.0	1				1						
James	7/23/07	41.318806	-85.72372		304	23.0	0										
James	7/23/07	41.31942	-85.722986		305	3.0	5				5	1					
James	7/23/07	41.319849	-85.723424		306	12.0	1			1							
James	7/23/07	41.320541	-85.723288		307	17.0	5			5				1			
James	7/23/07	41.321441	-85.723627		308	16.0	0										
James	7/23/07	41.322284	-85.724072		309	3.0	3			1	1			1			
James	7/23/07	41.322216	-85.725501		310	5.0	0										
James	7/23/07	41.323166	-85.725248		311	3.0	5				5			1			
James	7/23/07	41.323242	-85.726217		312	9.0	5			5							
James	7/23/07	41.323803	-85.727433		313	3.0	5				5			1			
James	7/23/07	41.323858	-85.728576		314	3.0	5				5	1		3			
James	7/23/07	41.323629	-85.729573		315	7.0	1			1							
James	7/23/07	41.3242	-85.730225		316	10.0	3			3				1			
James	7/23/07	41.324785	-85.731044		317	3.0	3				1		1	3	1		
James	7/23/07	41.324941	-85.731848		318	6.0	3			1	1			3			
James	7/23/07	41.325306	-85.732276		319	18.0	0										
James	7/23/07	41.325573	-85.733056		320	17.0	0										
James	7/23/07	41.32557	-85.733927		321	2.0	1			1					5		
James	7/23/07	41.325263	-85.734786		322	8.0	5			5							
James	7/23/07	41.325006	-85.735329		323	9.0	5			5							
James	7/23/07	41.324288	-85.735676		324	19.0	3			3							
James	7/23/07	41.32384	-85.736047		325	4.0	5			1	1	1		5			
James	7/23/07	41.32337	-85.735817		326	12.0	5			5							
James	7/23/07	41.322955	-85.73535		327	8.0	5			5							
James	7/23/07	41.322734	-85.734554		328	8.0	5			5					1		
James	7/23/07	41.322519	-85.73417		329	9.0	0										
James	7/23/07	41.322913	-85.732784		330	13.0	5			5				1			

7.2 2007 Vegetation Control Permits

2008 Lake Tippecanoe Vegetation Control Permit Application

			Return to: Page 1 of 6
	APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT	**FOR OFFICE USE ONLY**	DEPARTMENT OF NATURAL RESOURCES
	State Form 26727 (R / 11-03)	License No.	Division of Fish and Wildlife
	Approved State Board of Accounts 1987		Commercial License Clerk
	☐ Whole Lake ☒ Multiple Treatment Areas	Date Issued	402 West Washington Street, Room W273
	Check type of permit	Lake County	Indianapolis, IN 46204
	INSTRUCTIONS: Please print or type information		FEE: $5.00

Applicant's Name	Lake Assoc. Name	
Lake Tippecanoe POA	Lake Tippecanoe POA	
Rural Route or Street		Phone Number
67 EMS T49A		812-497-2410
City and State		ZIP Code
Syracuse, IN		46567
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number
City and State		ZIP Code

Lake (One application per lake)	Nearest Town	County		
Lake Tippecanoe	North Webster	Kosciusko		
Does water flow into a water supply			☐ Yes	☒ No

Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area #	1	LAT/LONG or UTM's	Treatment of EWM and CLP where they occur (no more than 70 acres, see avmp)
Total acres to be controlled	<70	Proposed shoreline treatment length (ft)	Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft)	18	Expected date(s) of treatment(s)	Early Spring Depending on Water Temp.

Treatment method: ☒ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Renovate or 2,4-D for EWM control and low dose Aquathol for selective CLP control (see avmp)

Plant survey method: ☒ Rake ☒ Visual ☐ Other (specify) Spring Visual and Rake Survey

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Curlyleaf Pondweed	X	40
Flatstem Pondweed		5
Chara		10
Coontail		10
Largeleaf pondweed		2
Eurasian Watermilfoil	X	10
Richardson's Pondweed		10
Eel Grass		2
White Water lily		2
Elodea		2
Variable pondweed		2
Sago Pondweed		3
Spatterdock		2

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Treatment Area #	2	LAT/LONG or UTM's	Center of bed @ N41.32835 W85.77511				
Total acres to be controlled	1.86	Proposed shoreline treatment length (ft)	996	Perpendicular distance from shoreline (ft)	50		
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth				
Treatment method:	X Chemical	Physical	Biological Control	Mechanical			

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass in nuisance areas only

Plant survey method: X Rake X Visual Other (specify) Summer Survey

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	60
Flat-stemmed pondweed		10
Chara spp.		10
Common naiad		10
Sago pondweed		10

Treatment Area #	3	LAT/LONG or UTM's	Center of bed @ N41.32234 W85.75774				
Total acres to be controlled	16	Proposed shoreline treatment length (ft)	10084	Perpendicular distance from shoreline (ft)	50		
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth				
Treatment method:	X Chemical	Physical	Biological Control	Mechanical			

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass only in nuisance areas

Plant survey method: Rake X Visual Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel Grass	X	65
Coontail		15
Sago pondweed		10
Chara		5
Eurasian watermilfoil		2
Richardson's pondweed		1
Variable pondweed		1
Common naiad		1

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Treatment Area #	4	LAT/LONG or UTM's	Center of bed @ N41.32483 W85.74374				
Total acres to be controlled	1.5	Proposed shoreline treatment length (ft)	609	Perpendicular distance from shoreline (ft)	50-100		
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth				
Treatment method:	X Chemical	Physical	Biological Control	Mechanical			

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass only in nuisance areas

Plant survey method: X Rake X Visual Other (specify) Summer Survey

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	75
Coontail		15
Chara		5
Eurasian watermiloil		3
Richardson's pondweed		2

Treatment Area #	5	LAT/LONG or UTM's	Center of bed @ N41.32737 W85.75197				
Total acres to be controlled	2.75	Proposed shoreline treatment length (ft)	1735	Perpendicular distance from shoreline (ft)	50		
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth				
Treatment method:	X Chemical	Physical	Biological Control	Mechanical			

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass only in nuisance areas

Plant survey method: Rake X Visual Other (specify) Summer survey

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	80
Coontail		10
Chara		8
Water Stargrass		2

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Treatment Area #	6	LAT/LONG or UTM's	Center of bed @ N41.33011 W85.7602				
Total acres to be controlled	3.25	Proposed shoreline treatment length (ft)		1933	Perpendicular distance from shoreline (ft)		50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth				
Treatment method:	X Chemical	Physical	Biological Control	Mechanical			

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass only in nuisance areas

Plant survey method: X Rake X Visual Other (specify) Summer Survey

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	80
Water Stargrass		5
Common naiad		5
Coontail		5
Chara spp.		5

Treatment Area #	7	LAT/LONG or UTM's	Center of bed @ N41.33741 W85.77077				
Total acres to be controlled	3.22	Proposed shoreline treatment length (ft)		2126	Perpendicular distance from shoreline (ft)		50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth				
Treatment method:	X Chemical	Physical	Biological Control	Mechanical			

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass in nuisance areas

Plant survey method: Rake X Visual Other (specify) Summer Survey

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	40
Eurasian watermilfoil		20
Chara		10
Coontail		10
Flat-stemmed pondweed		10
Richardson's pondweed		10

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Treatment Area #	8	LAT/LONG or UTM's	Center of Bed @ N41.33295 W85.77929		
Total acres to be controlled	2.63	Proposed shoreline treatment length (ft)	1711	Perpendicular distance from shoreline (ft)	50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass in nuisance areas

Plant survey method: [X] Rake [X] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	30
Chara		30
Coontail		30
Common naiad		10

INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.

Applicant Signature	Date
Certified Applicant's Signature	Date

FOR OFFICE ONLY

[ ] Approved [ ] Disapproved	Fisheries Staff Specialist
[ ] Approved [ ] Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of $5.00 to:

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

Lake Tippecanoe-Vegetation Control Permit Map (Page 6)

2008 James Lake-Vegetation Control Permit Application

			Return to: Page 1 of 5
	APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT	**FOR OFFICE USE ONLY**	DEPARTMENT OF NATURAL RESOURCES
	State Form 26727 (R / 11-03)	License No.	Division of Fish and Wildlife
	Approved State Board of Accounts 1987		Commercial License Clerk
	[ ] Whole Lake [X] Multiple Treatment Areas	Date Issued	402 West Washington Street, Room W273
	Check type of permit	Lake County	Indianapolis, IN 46204
	INSTRUCTIONS: Please print or type information		FEE: $5.00

Applicant's Name: Lake Tippecanoe POA	Lake Assoc. Name: Lake Tippecanoe POA	
Rural Route or Street: 67 EMS T49 A		Phone Number: 574-834-2185
City and State: Syracuse, IN		ZIP Code: 46567
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number: F38005
Rural Route or Street		
City and State		ZIP Code

Lake (One application per lake): Lake James	Nearest Town: North Webster	County: Kosciusko
Does water flow into a water supply	[ ] Yes	[X] No

Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area # 1	LAT/LONG or UTM's	Treatment of Eurasian watermilfoil and curlyleaf where it occurs (see avmp update)	
Total acres to be controlled: <30 acres	Proposed shoreline treatment length (ft)		Perpendicular distance from shoreline (ft)
Maximum Depth of Treatment (ft): 18	Expected date(s) of treatment(s): Early April (water temp dependent)		
Treatment method: [X] Chemical	[ ] Physical	[ ] Biological Control	[ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Renovate or 2,4-D for EWM and low dose Aquathol K for curlyleaf pondweed

Plant survey method: [X] Rake [X] Visual [ ] Other (specify) Spring Survey Results

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Curlyleaf Pondweed	X	30
Coontail		15
Chara		15
Eurasian watermilfoil	X	10
Flatstem Pondweed		3
White water lily		5
Spatterdock		5
Sago pondweed		5
Eel Grass		10
Horned pondweed		1
Small pondweed		1

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Treatment Area #	2	LAT/LONG or UTM's	Center of bed @ N41.32471 W85.73584		
Total acres to be controlled	1.75	Proposed shoreline treatment length (ft)	970	Perpendicular distance from shoreline (ft)	50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol herbicide will be used for control of eel grass in nuisance areas only

Plant survey method: [X] Rake [X] Visual [ ] Other (specify) Summer Survey Results

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	50
Coontail		45
Common naiad		5
Sago pondweed		5
Flat-stemmed pondweed		5

Treatment Area #	3	LAT/LONG or UTM's	Center of bed @ N41.32359 W85.72535		
Total acres to be controlled	1.86	Proposed shoreline treatment length (ft)	1190	Perpendicular distance from shoreline (ft)	50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and hydrothol herbicide will be used for control of eel grass in nuisance areas only

Plant survey method: [X] Rake [X] Visual [ ] Other (specify) Summer Survey Results

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	40
Coontail		40
Common naiad		10
Chara spp.		5
Variable pondweed		5

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Treatment Area #	4	LAT/LONG or UTM's	Center of bed @ N41.31750 W85.72284		
Total acres to be controlled	1.5	Proposed shoreline treatment length (ft)	930	Perpendicular distance from shoreline (ft)	50-100
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and hydrothol herbicide will be used for control of eel grass in nuisance areas only

Plant survey method: [X] Rake [X] Visual [ ] Other (specify) Summer Survey Results

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	45
Coontail		35
Chara		10
Common naiad		5
Water stargrass		5

Treatment Area #		LAT/LONG or UTM's			
Total acres to be controlled		Proposed shoreline treatment length (ft)	channel	Perpendicular distance from shoreline (ft)	channel
Maximum Depth of Treatment (ft)		Expected date(s) of treatment(s)			

Treatment method: [ ] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control.

Plant survey method: [ ] Rake [ ] Visual [ ] Other (specify)

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community

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Treatment Area #	5	LAT/LONG or UTM's	Center of bed @ N41.31256 W85.72381		
Total acres to be controlled	1	Proposed shoreline treatment length (ft)	515	Perpendicular distance from shoreline (ft)	50-100
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer		

Treatment method: [x] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique herbicide will be used for control of eel grass in nuisance areas only

Plant survey method: [x] Rake [ ] Visual [ ] Other (specify) Summer Survey results

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	70
Chara		20
Coontail		10

INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.

Applicant Signature	Date
Certified Applicant's Signature	Date

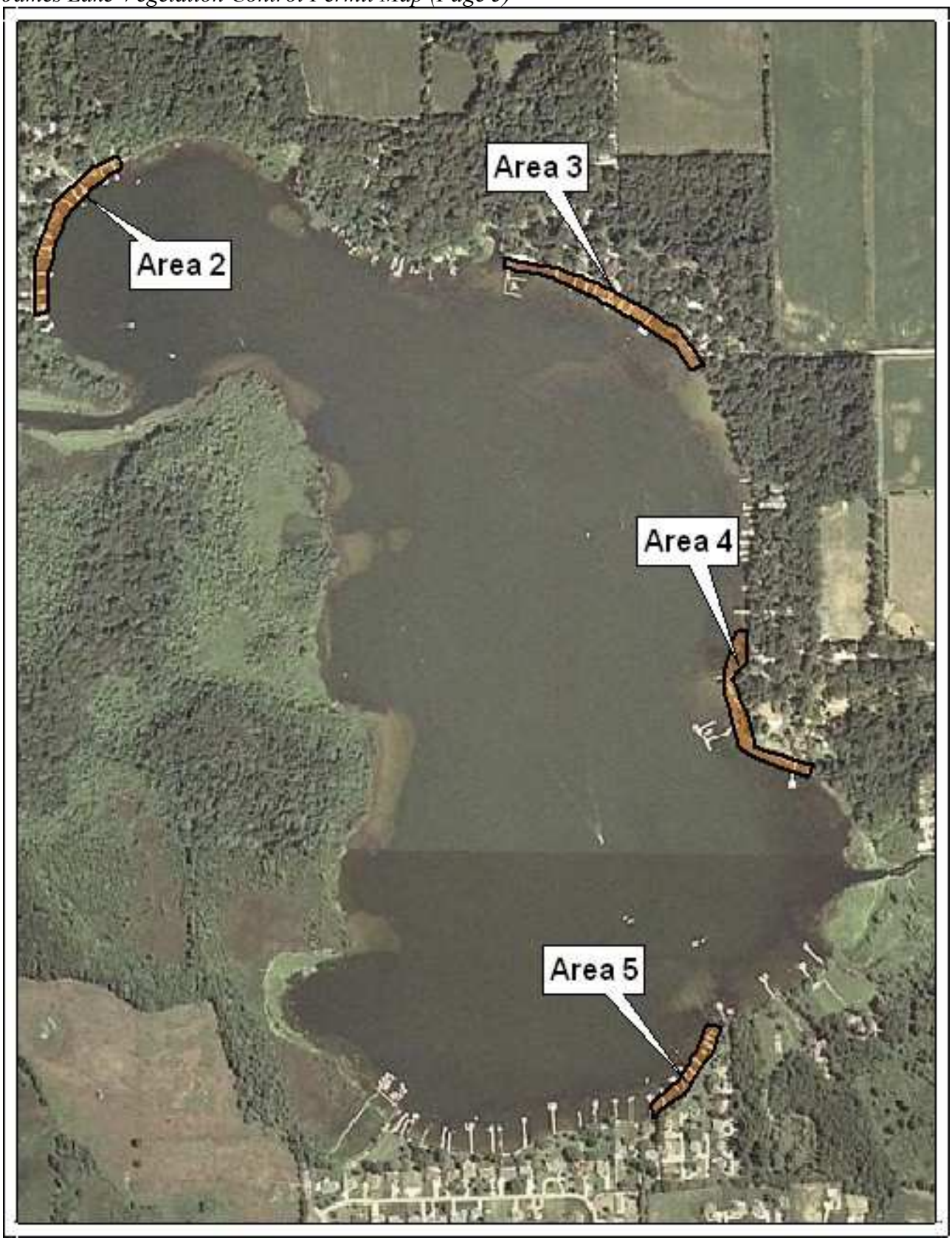
FOR OFFICE ONLY

[ ] Approved [ ] Disapproved	Fisheries Staff Specialist
[ ] Approved [ ] Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of $5.00 to:

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

James Lake-Vegetation Control Permit Map (Page 5)



2008 Oswego Lake-Vegetation Control Permit Application

			Return to: Page 1 of 3
	APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT	**FOR OFFICE USE ONLY**	DEPARTMENT OF NATURAL RESOURCES
	State Form 26727 (R / 11-03)	License No.	Division of Fish and Wildlife
	Approved State Board of Accounts 1987	Date Issued	Commercial License Clerk
	☐ Whole Lake ☒ Multiple Treatment Areas		402 West Washington Street, Room W273
	Check type of permit	Lake County	Indianapolis, IN 46204
	INSTRUCTIONS: Please print or type information		FEE: $5.00

Applicant's Name	Lake Assoc. Name	
Lake Tippecanoe POA	Lake Tippecanoe POA	
Rural Route or Street		Phone Number
67 ENS T49A		812-497-2410
City and State		ZIP Code
Syracuse, IN		46567
Certified Applicator (if applicable)	Company or Inc. Name	Certification Number
Rural Route or Street		Phone Number
City and State		ZIP Code

Lake (One application per lake)	Nearest Town	County		
Oswego Lake	North Webster	Kosciusko		
Does water flow into a water supply			☐ Yes	☒ No

Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.

Treatment Area #	1	LAT/LONG or UTM's	Treatment of EWM and CLP throughout lake (areas determined following survey, no more than 20 acres)		
Total acres to be controlled	<20 acres	Proposed shoreline treatment length (ft)		Perpendicular distance from shoreline (ft)	
Maximum Depth of Treatment (ft)	18	Expected date(s) of treatment(s)	Early April for Curlyleaf and EWM (potential later treatment for EWM)		
Treatment method:	☒ Chemical	☐ Physical	☐ Biological Control	☐ Mechanical	

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Renovate or 2,4-D granular for selective control of EWM and low dose Aquathol K for selective control of CLP (see 2006 avmp update)

Plant survey method: ☒ Rake ☒ Visual ☐ Other (specify) Spring Survey Results

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Chara		25
Coontail		15
Curlyleaf Pondweed	X	30
Flatstem Pondweed		1
Variable watermilfoil		5
Eurasian Watermilfoil	X	15
Richardson's Pondweed		1
Illinois pondweed		1
Eel grass		2
American elodea		1
spatterdock		1
horned pondweed		1
white water lily		2

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Treatment Area #	2	LAT/LONG or UTM's	Center of Bed @ N41.32923 W85.78409		
Total acres to be controlled	2.12	Proposed shoreline treatment length (ft)	2100	Perpendicular distance from shoreline (ft)	50
Maximum Depth of Treatment (ft)	6	Expected date(s) of treatment(s)	mid to late summer depending on plant growth		

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Nautique and Hydrothol will be used to control eel grass only in nuisance areas

Plant survey method: [X] Rake [X] Visual [ ] Other (specify) Summer Survey

Aquatic Plant Name	Check if Target Species	Relative Abundance % of Community
Eel grass	X	25
Chara		20
Coontail		25
Spiny Naiad		5
Sago pondweed		5
Small Pondweed		5
Richardson's Pondweed		3
Flatstem Pondweed		3

INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.

Applicant Signature	Date
Certified Applicant's Signature	Date

FOR OFFICE ONLY

[ ] Approved [ ] Disapproved	Fisheries Staff Specialist
[ ] Approved [ ] Disapproved	Environmental Staff Specialist

Mail check or money order in the amount of $5.00 to:

DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

Oswego Lake-Vegetation Control Permit Application Map (Page 3)